THERMODYNAMIC AND TRANSPORT PROPERTIES
OF AIR AND ITS PRODUCTS OF COMBUSTION
WITH ASTM-A-1 FUEL AND NATURAL GAS
AT 20, 30, AND 40 ATMOSPHERES

by David J. Poferl and Roger A. Svehla

Lewis Research Center
Cleveland, Ohio 44135

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION • WASHINGTON, D. C. • DECEMBER 1973
**Title and Subtitle**
THERMODYNAMIC AND TRANSPORT PROPERTIES OF AIR AND ITS PRODUCTS OF COMBUSTION WITH ASTM-A-1 FUEL AND NATURAL GAS AT 20, 30, AND 40 ATMOSPHERES

**Author(s)**
David J. Poferl and Roger A. Svehla

**Abstract**
The isentropic exponent, molecular weight, viscosity, specific heat at constant pressure, thermal conductivity, Prandtl number, and enthalpy were calculated for air, the combustion products of ASTM-A-1 jet fuel and air, and the combustion products of natural gas and air. The properties were calculated over a temperature range from 300 to 2800 K in 100 K increments and for pressures of 20, 30, and 40 atmospheres. The data for natural gas and ASTM-A-1 were calculated for fuel-air ratios from zero to stoichiometric in 0.01 increments.

**Key Words (Suggested by Author(s))**
Thermodynamic properties; Transport properties; Air; Jet fuel; Natural gas

**Distribution Statement**
Unclassified - unlimited

---

For sale by the National Technical Information Service, Springfield, Virginia 22151
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUMMARY</td>
<td>1</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>SYMBOLS</td>
<td>2</td>
</tr>
<tr>
<td>THERMODYNAMIC AND TRANSPORT PROPERTY CALCULATIONS PROGRAM</td>
<td>2</td>
</tr>
<tr>
<td>THERMODYNAMIC AND TRANSPORT PROPERTIES</td>
<td>3</td>
</tr>
<tr>
<td>Air</td>
<td>3</td>
</tr>
<tr>
<td>Combustion Products of ASTM-A-1 and Air</td>
<td>3</td>
</tr>
<tr>
<td>Combustion Products of Natural Gas and Air</td>
<td>4</td>
</tr>
<tr>
<td>CONCLUDING REMARKS</td>
<td>5</td>
</tr>
<tr>
<td>APPENDIXES</td>
<td></td>
</tr>
<tr>
<td>A - COMPOSITIONS OF AIR, ASTM-A-1, AND NATURAL GAS</td>
<td>6</td>
</tr>
<tr>
<td>B - CONVERSION UNITS FOR VISCOSITY, THERMAL CONDUCTIVITY, SPECIFIC HEAT AT CONSTANT PRESSURE, AND ENTHALPY</td>
<td>7</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>9</td>
</tr>
<tr>
<td>TABLES</td>
<td></td>
</tr>
<tr>
<td>I - THERMODYNAMIC AND TRANSPORT PROPERTIES OF AIR AT 20 ATMOSPHERES</td>
<td>10</td>
</tr>
<tr>
<td>II - THERMODYNAMIC AND TRANSPORT PROPERTIES OF AIR AT 30 ATMOSPHERES</td>
<td>11</td>
</tr>
<tr>
<td>III - THERMODYNAMIC AND TRANSPORT PROPERTIES OF AIR AT 40 ATMOSPHERES</td>
<td>12</td>
</tr>
</tbody>
</table>
TABLES (Continued)

VII - THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE
    COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT
    20 ATMOSPHERES ................................................. 34
VIII - THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE
    COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT
    30 ATMOSPHERES ................................................. 41
IX - THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE
     COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT
     40 ATMOSPHERES ................................................. 48
THERMODYNAMIC AND TRANSPORT PROPERTIES OF AIR AND ITS PRODUCTS
OF COMBUSTION WITH ASTM-A-1 FUEL AND NATURAL GAS
AT 20, 30, AND 40 ATMOSPHERES
by David J. Poferl and Roger A. Svehla
Lewis Research Center

SUMMARY

The isentropic exponent, molecular weight, viscosity, specific heat at constant
pressure, thermal conductivity, Prandtl number, and enthalpy were calculated for air,
the combustion products of ASTM-A-1 jet fuel and air, and the combustion products of
natural gas and air. The properties were calculated over a temperature range from 300
to 2800 K in 100 K increments and for pressures of 20, 30, and 40 atmospheres. The
data for natural gas and ASTM-A-1 were calculated for fuel-air ratios from zero to stoi-
chiometric in 0.01 increments.

INTRODUCTION

An analytical investigation was conducted to determine the thermodynamic and trans-
port properties for air, the combustion products of ASTM-A-1 jet fuel and air, and the
combustion products of natural gas and air at the pressures and temperatures encoun-
tered in NASA jet engine design studies. Data for these properties were not available in
the literature over the full range of interest (e.g., refs. 1 and 2). Accurate values are
required for performing jet engine cycle studies and for designing cooling configurations
for combustor liners and turbine vanes and blades. Since the gas temperatures of inter-
est are usually too high for the properties to be measured directly, the properties must
be calculated.

The properties calculated were the isentropic exponent \( \gamma \), molecular weight \( m \), vis-
cosity \( \mu \), specific heat at constant pressure \( c_p \), thermal conductivity \( k \), Prandtl num-
ber \( Pr \), and enthalpy \( h \). The calculations were made for (1) air, (2) ASTM-A-1 jet fuel
burned in air, and (3) natural gas burned in air. All properties were calculated for tem-
peratures from 300 to 2800 K at pressures of 20, 30, and 40 atmospheres. The
properties for the combustion products of both ASTM-A-1 and natural gas were determined for fuel-air ratios from 0.01 to stoichiometric.

**SYMBOLES**

\[ c_p \] specific heat at constant pressure, cal/(g)(K)
\[ h \] enthalpy, cal/g
\[ k \] thermal conductivity, cal/(cm)(sec)(K)
\[ m \] molecular weight
\[ P \] pressure, atm
\[ Pr \] Prandtl number
\[ s \] entropy, cal/(g)(K)
\[ T \] temperature, K
\[ \gamma \] isentropic exponent, \( \frac{\partial \ln P}{\partial \ln \rho} \)
\[ \mu \] viscosity, g/(cm)(sec)

**THERMODYNAMIC AND TRANSPORT PROPERTY CALCULATIONS PROGRAM**

The program used to calculate the thermodynamic and transport properties is described in references 3 and 4. It is a program which combines the thermodynamic chemical equilibrium compositions program (ref. 5) with additional routines to calculate the transport properties. Condensed species, as well as gaseous species, are considered when obtaining the equilibrium composition and when calculating the thermodynamic properties. However, only the gaseous species are used when calculating the transport properties.

Because of storage limitations, the maximum allowable number of species is 100 and the maximum number of chemical elements is 10 for the thermodynamic property calculations. However, in computing the transport properties, the equilibrium composition obtained from the thermodynamic calculations is searched for the 20 gaseous species with the largest concentrations. All gaseous species with equilibrium mole fractions less than \( 10^{-7} \) are omitted.

The transport cross-section data used in the calculations are the data included with the program described in reference 4. Most of these data came from references 3 and 6 to 9. Rotational relaxation effects are included in calculating the thermal conductivity. Input data used in the transport property calculations are slightly different than the data.
used in calculating the properties of reference 1. However, the differences are gener-
ally small and change the results by only a few percent. In order to see the actual dif-
fferences used in the input, the reader is referred to reference 4.

The compositions assumed for air, ASTM-A-1, and natural gas are given in appen-
dix A.

THERMODYNAMIC AND TRANSPORT PROPERTIES

Calculations of thermodynamic and transport properties were made for air, ASTM-
A-1 burned in air, and natural gas burned in air at temperatures from 300 to 2800 K in
100 K increments; at pressures of 20, 30, and 40 atmospheres; and at fuel-air ratios
from 0.01 to stoichiometric in 0.01 increments. The results of these calculations are
presented in tables I to IX. Conversion units for viscosity, thermal conductivity, spe-
cific heat at constant pressure, and enthalpy are given in appendix B. Reference enthal-
pies are the same as those given in reference 5; that is, the enthalpy of the elements in
their most stable form is assumed to be zero at 298.15 K.

Air

The thermodynamic and transport properties $\gamma$, $m$, $\mu$, $c_p$, $k$, Pr, and $h$ of air at
pressures of 20, 30, and 40 atmospheres are given in tables I to III, respectively. The
data show that the isentropic exponent decreases with increasing temperature, whereas
the viscosity, specific heat at constant pressure, thermal conductivity, and enthalpy in-
crease with increasing temperature. The molecular weight and Prandtl number remain
nearly constant until dissociation effects become apparent at approximately 2000 K. Fur-
thermore, since the composition remains constant, increasing the pressure from 20 to
40 atmospheres has essentially no effect on the thermodynamic and transport properties
at temperatures below approximately 2000 K. The difference in the viscosity of air at 20
and 40 atmospheres is negligible over the entire range of temperatures presented.
Above 2000 K, $\gamma$, $m$, and Pr increase with increasing pressure, whereas $c_p$, $k$, and $h$
decrease with increasing pressure. The greatest effect of pressure occurs in the $c_p$, $k$, and
Pr data.

Combustion Products of ASTM-A-1 and Air

The thermodynamic and transport properties of the combustion products of ASTM-
A-1 are given in table IV for fuel-air ratios from 0.01 to stoichiometric at a pressure of
20 atmospheres. The trend of the properties with temperature is the same as that described for air. The effect of fuel-air ratio varies with the particular property being considered. That is, the isentropic exponent and enthalpy decrease with increasing fuel-air ratio, whereas the specific heat at constant pressure and thermal conductivity increase with increasing fuel-air ratio. At temperatures above approximately 1700 K, the molecular weight decreases with increasing fuel-air ratio. Below 1700 K, the molecular weight is essentially independent of fuel-air ratio over the range of fuel-air ratios investigated. The viscosity increases with increasing fuel-air ratio at temperatures above approximately 1400 K, whereas the opposite trend is observed below 1400 K. The Prandtl number increases with increasing fuel-air ratio below about 1500 K and decreases at temperatures greater than 1500 K. The properties most affected by fuel-air ratio are specific heat at constant pressure, thermal conductivity, and enthalpy.

This behavior can be qualitatively explained in terms of the change in the equilibrium combustion product composition with fuel-air ratio changes. At the lower temperatures the properties change solely because of the greater percentage of combustion products in the mixture. This affects all the properties to some degree. However, at higher temperatures another effect becomes important, dissociation. Chemical reactions, and in particular dissociation, have a very pronounced effect on some properties, especially the specific heat at constant pressure and thermal conductivity. There can be a very large enhancement in the value of these properties over that for nondissociating species. See reference 4 for a more detailed explanation and reference 3 for figures showing the effects of varying temperature, pressure, and fuel-oxidant mixture ratios over a large range of conditions.

Similar data for the properties at 30 and 40 atmospheres are given in tables V and VI, respectively. The effect of fuel-air ratio on the property data at 30 and 40 atmospheres is the same as that presented for a pressure of 20 atmospheres. All property variations with pressure are similar to those discussed previously for air, with the effect of pressure becoming noticeable above approximately 1700 K.

Combustion Products of Natural Gas and Air

The properties of the combustion products of natural gas are presented in table VII for fuel-air ratios from 0.01 to stoichiometric at a pressure of 20 atmospheres. The variation of property data with fuel-air ratio and temperature is similar to that discussed previously for ASTM-A-1. The only significant difference is that the molecular weight of the combustion products of natural gas is more sensitive to fuel-air ratio than is the molecular weight of the combustion products of ASTM-A-1. The reason is that the hydrogen/carbon ratio of natural gas is higher than that of ASTM-A-1.
Property data for the combustion products of natural gas at pressures of 30 and 40 atmospheres are given in tables VIII and IX, respectively. All property variations with pressure are similar to those for air and the combustion products of ASTM-A-1. Comparing tables IV to IX shows that at any given temperature, pressure, and fuel-air ratio, \( \gamma, m, \text{Pr}, \text{and } h \) for the combustion products of natural gas are in general lower than the corresponding values for the combustion products of ASTM-A-1. However, the reverse is true for \( c_p \) and \( k \) over the range of temperature, pressure, and fuel-air ratio investigated. The viscosity at any given temperature and pressure is essentially the same for the combustion products of both natural gas and ASTM-A-1.

**CONCLUDING REMARKS**

The isentropic exponent, molecular weight, viscosity, specific heat at constant pressure, thermal conductivity, Prandtl number and enthalpy were calculated for air, the combustion products of ASTM-A-1 and air, and the combustion products of natural gas and air. These properties were calculated for temperatures from 300 to 2800 K and for pressures of 20, 30, and 40 atmospheres. The data for ASTM-A-1 and natural gas were determined for fuel-air ratios from 0.01 to stoichiometric.

The theoretical data presented herein are for the combustion products of air and the fuels defined in appendix A. However, it is estimated that the difference between calculated thermodynamic and transport properties of the combustion products of ASTM-A-1 burned in air and the properties of any of the typical JP fuels burned in air will be less than 0.5 percent for the same equivalence ratio. Likewise, errors of less than 0.5 percent will be introduced if the thermodynamic and transport properties of the combustion products of natural gas are used for the properties of the combustion products of methane or any nominal natural gas composition.

The effect of pressure on the theoretical properties is negligible for temperatures less than 2000 K for air and for temperatures less than approximately 1700 K for the combustion products of ASTM-A-1 or natural gas since the amount of dissociation does not become a significant factor until these temperatures are reached. The properties most affected by fuel-air ratio were specific heat at constant pressure, thermal conductivity, and enthalpy. The specific heat at constant pressure, thermal conductivity, and Prandtl number were the most sensitive to pressure.

Lewis Research Center,
National Aeronautics and Space Administration,
Cleveland, Ohio, August 10, 1973,
The following compositions were assumed for air, ASTM-A-1, and natural gas. The composition of air is given by the following formula:

\[
C_{0.00030} N_{1.56176} O_{0.41959} Ar_{0.00932}
\]

ASTM-A-1 jet fuel was assumed to have the composition \( \text{CH}_1 \text{.9185} \). Natural gas was assumed to consist of the following components:

<table>
<thead>
<tr>
<th>Component</th>
<th>Composition, wt. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen, ( N_2 )</td>
<td>2.648</td>
</tr>
<tr>
<td>Methane, ( \text{CH}_4 )</td>
<td>87.474</td>
</tr>
<tr>
<td>Carbon dioxide, ( \text{CO}_2 )</td>
<td>1.181</td>
</tr>
<tr>
<td>Ethane, ( \text{C}_2\text{H}_6 )</td>
<td>6.332</td>
</tr>
<tr>
<td>Propane, ( \text{C}_3\text{H}_8 )</td>
<td>1.621</td>
</tr>
<tr>
<td>Butane, ( \text{C}<em>4\text{H}</em>{10} )</td>
<td>.576</td>
</tr>
<tr>
<td>Pentane, ( \text{C}<em>5\text{H}</em>{12} )</td>
<td>.168</td>
</tr>
</tbody>
</table>
APPENDIX B

CONVERSION UNITS FOR VISCOSITY, THERMAL CONDUCTIVITY, SPECIFIC HEAT AT CONSTANT PRESSURE, AND ENTHALPY

The factors for converting viscosity, thermal conductivity, specific heat at constant pressure, and enthalpy from cgs units to SI and English units are the following:

Viscosity:

\[
1 \frac{g}{(cm)(sec)} = 0.1 \frac{(N)(sec)}{m^2}
\]

\[
= 6.72 \times 10^{-2} \frac{lbm}{(ft)(sec)}
\]

\[
= 241.9 \frac{lbm}{(ft)(hr)}
\]

\[
= 2.089 \times 10^{-3} \frac{(lbf)(sec)}{ft^2}
\]

Thermal conductivity:

\[
1 \frac{cal}{(cm)(sec)(K)} = 418.4 \frac{W}{(m)(K)}
\]

\[
= 0.8064 \frac{Btu}{(ft)^2(sec)(^\circ F/in.)}
\]

\[
= 6.72 \times 10^{-2} \frac{Btu}{(ft^2)(sec)(^\circ F/ft)}
\]

\[
= 241.9 \frac{Btu}{(ft)^2(hr)(^\circ F/ft)}
\]
Specific heat at constant pressure:

\[
1 \frac{\text{cal}}{(g)(K)} = 4.184 \frac{J}{(g)(K)}
\]

\[= 1 \frac{\text{Btu}}{(\text{lbm})(^\circ\text{F})}\]

Enthalpy:

\[
1 \frac{\text{cal}}{\text{g}} = 4.184 \frac{J}{\text{g}}
\]

\[= 1.8 \frac{\text{Btu}}{\text{lbm}}\]
REFERENCES


<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2309</td>
<td>28.890</td>
<td>821 x 10^{-6}</td>
<td>0.3850</td>
<td>473 x 10^{-6}</td>
<td>0.669</td>
<td>747.0</td>
</tr>
<tr>
<td>2700</td>
<td>1.2374</td>
<td>28.915</td>
<td>800</td>
<td>0.3707</td>
<td>439</td>
<td>0.676</td>
<td>709.2</td>
</tr>
<tr>
<td>2600</td>
<td>1.2437</td>
<td>28.933</td>
<td>779</td>
<td>0.3588</td>
<td>409</td>
<td>0.683</td>
<td>672.7</td>
</tr>
<tr>
<td>2500</td>
<td>1.2498</td>
<td>28.945</td>
<td>758</td>
<td>0.3488</td>
<td>384</td>
<td>0.688</td>
<td>637.4</td>
</tr>
<tr>
<td>2400</td>
<td>1.2556</td>
<td>28.953</td>
<td>736</td>
<td>0.3404</td>
<td>362</td>
<td>0.692</td>
<td>602.9</td>
</tr>
<tr>
<td>2300</td>
<td>1.2612</td>
<td>28.958</td>
<td>715</td>
<td>0.3332</td>
<td>343</td>
<td>0.696</td>
<td>569.3</td>
</tr>
<tr>
<td>2200</td>
<td>1.2666</td>
<td>28.961</td>
<td>694</td>
<td>0.3270</td>
<td>325</td>
<td>0.698</td>
<td>536.2</td>
</tr>
<tr>
<td>2100</td>
<td>1.2719</td>
<td>28.963</td>
<td>672</td>
<td>0.3214</td>
<td>309</td>
<td>0.699</td>
<td>503.8</td>
</tr>
<tr>
<td>2000</td>
<td>1.2772</td>
<td>28.964</td>
<td>651</td>
<td>0.3163</td>
<td>294</td>
<td>0.700</td>
<td>471.9</td>
</tr>
<tr>
<td>1900</td>
<td>1.2825</td>
<td>28.965</td>
<td>629</td>
<td>0.3115</td>
<td>280</td>
<td>0.701</td>
<td>440.6</td>
</tr>
<tr>
<td>1800</td>
<td>1.2879</td>
<td></td>
<td>607</td>
<td>0.3070</td>
<td>266</td>
<td>0.702</td>
<td>409.6</td>
</tr>
<tr>
<td>1700</td>
<td>1.2933</td>
<td></td>
<td>585</td>
<td>0.3025</td>
<td>252</td>
<td>0.702</td>
<td>379.2</td>
</tr>
<tr>
<td>1600</td>
<td>1.2989</td>
<td></td>
<td>563</td>
<td>0.2981</td>
<td>239</td>
<td>0.703</td>
<td>349.1</td>
</tr>
<tr>
<td>1500</td>
<td>1.3045</td>
<td></td>
<td>540</td>
<td>0.2939</td>
<td>226</td>
<td>0.703</td>
<td>319.5</td>
</tr>
<tr>
<td>1400</td>
<td>1.3103</td>
<td></td>
<td>517</td>
<td>0.2897</td>
<td>213</td>
<td>0.704</td>
<td>290.3</td>
</tr>
<tr>
<td>1300</td>
<td>1.3162</td>
<td></td>
<td>494</td>
<td>0.2855</td>
<td>200</td>
<td>0.704</td>
<td>261.6</td>
</tr>
<tr>
<td>1200</td>
<td>1.3224</td>
<td></td>
<td>470</td>
<td>0.2814</td>
<td>188</td>
<td>0.705</td>
<td>233.2</td>
</tr>
<tr>
<td>1100</td>
<td>1.3288</td>
<td></td>
<td>445</td>
<td>0.2773</td>
<td>175</td>
<td>0.705</td>
<td>205.3</td>
</tr>
<tr>
<td>1000</td>
<td>1.3356</td>
<td></td>
<td>419</td>
<td>0.2730</td>
<td>162</td>
<td>0.705</td>
<td>177.8</td>
</tr>
<tr>
<td>900</td>
<td>1.3439</td>
<td></td>
<td>391</td>
<td>0.2681</td>
<td>148</td>
<td>0.706</td>
<td>150.7</td>
</tr>
<tr>
<td>800</td>
<td>1.3537</td>
<td></td>
<td>362</td>
<td>0.2626</td>
<td>135</td>
<td>0.706</td>
<td>124.2</td>
</tr>
<tr>
<td>700</td>
<td>1.3646</td>
<td></td>
<td>331</td>
<td>0.2568</td>
<td>121</td>
<td>0.706</td>
<td>98.2</td>
</tr>
<tr>
<td>600</td>
<td>1.3759</td>
<td></td>
<td>309</td>
<td>0.2511</td>
<td>106</td>
<td>0.706</td>
<td>72.8</td>
</tr>
<tr>
<td>500</td>
<td>1.3865</td>
<td></td>
<td>285</td>
<td>0.2461</td>
<td>92</td>
<td>0.706</td>
<td>48.0</td>
</tr>
<tr>
<td>400</td>
<td>1.3951</td>
<td></td>
<td>227</td>
<td>0.2422</td>
<td>78</td>
<td>0.706</td>
<td>23.6</td>
</tr>
<tr>
<td>300</td>
<td>1.4000</td>
<td></td>
<td>184</td>
<td>0.2401</td>
<td>63</td>
<td>0.706</td>
<td>-5.5</td>
</tr>
</tbody>
</table>
### TABLE II. - THERMODYNAMIC AND TRANSPORT PROPERTIES OF AIR AT 30 ATMOSPHERES

<table>
<thead>
<tr>
<th>Temperature, $T$, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, $m$</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, $k$, cal/(cm)(sec)(K)</th>
<th>Prandtl number, $Pr$</th>
<th>Enthalpy, $h$, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2340</td>
<td>28.904</td>
<td>821×10^{-6}</td>
<td>0.3773</td>
<td>460×10^{-6}</td>
<td>0.674</td>
<td>745.0</td>
</tr>
<tr>
<td>2700</td>
<td>1.2399</td>
<td>28.924</td>
<td>800</td>
<td>0.3652</td>
<td>430</td>
<td>0.680</td>
<td>707.9</td>
</tr>
<tr>
<td>2600</td>
<td>1.2456</td>
<td>28.939</td>
<td>779</td>
<td>0.3548</td>
<td>403</td>
<td>0.686</td>
<td>671.9</td>
</tr>
<tr>
<td>2500</td>
<td>1.2512</td>
<td>28.949</td>
<td>758</td>
<td>0.3462</td>
<td>380</td>
<td>0.690</td>
<td>636.8</td>
</tr>
<tr>
<td>2400</td>
<td>1.2566</td>
<td>28.956</td>
<td>736</td>
<td>0.3387</td>
<td>359</td>
<td>0.694</td>
<td>602.6</td>
</tr>
<tr>
<td>2300</td>
<td>1.2619</td>
<td>28.960</td>
<td>715</td>
<td>0.3321</td>
<td>341</td>
<td>0.696</td>
<td>569.1</td>
</tr>
<tr>
<td>2200</td>
<td>1.2671</td>
<td>28.962</td>
<td>694</td>
<td>0.3263</td>
<td>324</td>
<td>0.698</td>
<td>536.1</td>
</tr>
<tr>
<td>2100</td>
<td>1.2722</td>
<td>28.964</td>
<td>672</td>
<td>0.3211</td>
<td>309</td>
<td>0.699</td>
<td>503.8</td>
</tr>
<tr>
<td>2000</td>
<td>1.2773</td>
<td>28.965</td>
<td>651</td>
<td>0.3161</td>
<td>294</td>
<td>0.700</td>
<td>471.9</td>
</tr>
<tr>
<td>1900</td>
<td>1.2826</td>
<td>629</td>
<td></td>
<td>0.3115</td>
<td>280</td>
<td>0.701</td>
<td>440.5</td>
</tr>
<tr>
<td>1800</td>
<td>1.2879</td>
<td>607</td>
<td></td>
<td>0.3069</td>
<td>266</td>
<td>0.702</td>
<td>409.6</td>
</tr>
<tr>
<td>1700</td>
<td>1.2933</td>
<td>585</td>
<td></td>
<td>0.3025</td>
<td>252</td>
<td>0.702</td>
<td>379.2</td>
</tr>
<tr>
<td>1600</td>
<td>1.2988</td>
<td>563</td>
<td></td>
<td>0.2981</td>
<td>239</td>
<td>0.703</td>
<td>349.1</td>
</tr>
<tr>
<td>1500</td>
<td>1.3045</td>
<td>540</td>
<td></td>
<td>0.2939</td>
<td>226</td>
<td>0.703</td>
<td>319.5</td>
</tr>
<tr>
<td>1400</td>
<td>1.3103</td>
<td>517</td>
<td></td>
<td>0.2897</td>
<td>213</td>
<td>0.704</td>
<td>290.3</td>
</tr>
<tr>
<td>1300</td>
<td>1.3162</td>
<td>494</td>
<td></td>
<td>0.2855</td>
<td>200</td>
<td>0.704</td>
<td>261.6</td>
</tr>
<tr>
<td>1200</td>
<td>1.3223</td>
<td>470</td>
<td></td>
<td>0.2814</td>
<td>188</td>
<td>0.705</td>
<td>233.2</td>
</tr>
<tr>
<td>1100</td>
<td>1.3288</td>
<td>445</td>
<td></td>
<td>0.2773</td>
<td>175</td>
<td>0.705</td>
<td>205.3</td>
</tr>
<tr>
<td>1000</td>
<td>1.3356</td>
<td>419</td>
<td></td>
<td>0.2730</td>
<td>162</td>
<td>0.705</td>
<td>177.8</td>
</tr>
<tr>
<td>900</td>
<td>1.3439</td>
<td>28.964</td>
<td>391</td>
<td>0.2681</td>
<td>148</td>
<td>0.706</td>
<td>150.7</td>
</tr>
<tr>
<td>800</td>
<td>1.3537</td>
<td>362</td>
<td></td>
<td>0.2626</td>
<td>135</td>
<td>124.2</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1.3646</td>
<td>331</td>
<td></td>
<td>0.2568</td>
<td>121</td>
<td>98.2</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.3759</td>
<td>299</td>
<td></td>
<td>0.2511</td>
<td>106</td>
<td>72.8</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.3865</td>
<td>265</td>
<td></td>
<td>0.2461</td>
<td>92</td>
<td>48.0</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>1.3951</td>
<td>227</td>
<td></td>
<td>0.2422</td>
<td>78</td>
<td>23.6</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>1.4000</td>
<td>184</td>
<td></td>
<td>0.2401</td>
<td>63</td>
<td>-0.5</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE III. - THERMODYNAMIC AND TRANSPORT PROPERTIES OF AIR AT 40 ATMOSPHERES

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, m</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2360</td>
<td>28.913</td>
<td>$821 \times 10^{-6}$</td>
<td>0.3727</td>
<td>$452 \times 10^{-6}$</td>
<td>0.677</td>
<td>743.8</td>
</tr>
<tr>
<td>2700</td>
<td>1.2414</td>
<td>28.930</td>
<td>800</td>
<td>0.3619</td>
<td>424</td>
<td>0.683</td>
<td>707.1</td>
</tr>
<tr>
<td>2600</td>
<td>1.2468</td>
<td>28.943</td>
<td>779</td>
<td>0.3526</td>
<td>399</td>
<td>0.688</td>
<td>671.4</td>
</tr>
<tr>
<td>2500</td>
<td>1.2521</td>
<td>28.951</td>
<td>758</td>
<td>0.3446</td>
<td>377</td>
<td>0.692</td>
<td>636.5</td>
</tr>
<tr>
<td>2400</td>
<td>1.2573</td>
<td>28.957</td>
<td>736</td>
<td>0.3376</td>
<td>358</td>
<td>0.695</td>
<td>602.4</td>
</tr>
<tr>
<td>2300</td>
<td>1.2623</td>
<td>28.961</td>
<td>715</td>
<td>0.3315</td>
<td>340</td>
<td>0.697</td>
<td>569.0</td>
</tr>
<tr>
<td>2200</td>
<td>1.2673</td>
<td>28.963</td>
<td>694</td>
<td>0.3260</td>
<td>324</td>
<td>0.699</td>
<td>536.1</td>
</tr>
<tr>
<td>2100</td>
<td>1.2724</td>
<td>28.964</td>
<td>672</td>
<td>0.3209</td>
<td>308</td>
<td>0.700</td>
<td>503.8</td>
</tr>
<tr>
<td>2000</td>
<td>1.2774</td>
<td>28.965</td>
<td>651</td>
<td>0.3160</td>
<td>294</td>
<td>0.700</td>
<td>471.9</td>
</tr>
<tr>
<td>1900</td>
<td>1.2826</td>
<td></td>
<td>629</td>
<td>0.3114</td>
<td>279</td>
<td>0.701</td>
<td>440.5</td>
</tr>
<tr>
<td>1800</td>
<td>1.2879</td>
<td></td>
<td>607</td>
<td>0.3069</td>
<td>266</td>
<td>0.702</td>
<td>409.6</td>
</tr>
<tr>
<td>1700</td>
<td>1.2933</td>
<td></td>
<td>585</td>
<td>0.3025</td>
<td>252</td>
<td>0.702</td>
<td>379.2</td>
</tr>
<tr>
<td>1600</td>
<td>1.2988</td>
<td></td>
<td>563</td>
<td>0.2981</td>
<td>239</td>
<td>0.703</td>
<td>349.1</td>
</tr>
<tr>
<td>1500</td>
<td>1.3045</td>
<td></td>
<td>540</td>
<td>0.2939</td>
<td>226</td>
<td>0.703</td>
<td>319.5</td>
</tr>
<tr>
<td>1400</td>
<td>1.3103</td>
<td></td>
<td>517</td>
<td>0.2897</td>
<td>213</td>
<td>0.704</td>
<td>290.4</td>
</tr>
<tr>
<td>1300</td>
<td>1.3162</td>
<td></td>
<td>494</td>
<td>0.2855</td>
<td>200</td>
<td>0.704</td>
<td>261.6</td>
</tr>
<tr>
<td>1200</td>
<td>1.3223</td>
<td></td>
<td>470</td>
<td>0.2814</td>
<td>188</td>
<td>0.705</td>
<td>233.2</td>
</tr>
<tr>
<td>1100</td>
<td>1.3288</td>
<td></td>
<td>445</td>
<td>0.2773</td>
<td>175</td>
<td>0.705</td>
<td>205.3</td>
</tr>
<tr>
<td>1000</td>
<td>1.3356</td>
<td></td>
<td>419</td>
<td>0.2730</td>
<td>162</td>
<td>0.705</td>
<td>177.8</td>
</tr>
<tr>
<td>900</td>
<td>1.3439</td>
<td></td>
<td>391</td>
<td>0.2681</td>
<td>148</td>
<td>0.706</td>
<td>150.7</td>
</tr>
<tr>
<td>800</td>
<td>1.3537</td>
<td>28.964</td>
<td>362</td>
<td>0.2626</td>
<td>135</td>
<td></td>
<td>124.2</td>
</tr>
<tr>
<td>700</td>
<td>1.3646</td>
<td></td>
<td>331</td>
<td>0.2568</td>
<td>121</td>
<td></td>
<td>98.2</td>
</tr>
<tr>
<td>600</td>
<td>1.3759</td>
<td></td>
<td>301</td>
<td>0.2511</td>
<td>106</td>
<td></td>
<td>72.8</td>
</tr>
<tr>
<td>500</td>
<td>1.3865</td>
<td></td>
<td>265</td>
<td>0.2461</td>
<td>92</td>
<td></td>
<td>48.0</td>
</tr>
<tr>
<td>400</td>
<td>1.3951</td>
<td></td>
<td>227</td>
<td>0.2422</td>
<td>78</td>
<td></td>
<td>23.6</td>
</tr>
<tr>
<td>300</td>
<td>1.4000</td>
<td></td>
<td>184</td>
<td>0.2401</td>
<td>63</td>
<td></td>
<td>-5</td>
</tr>
</tbody>
</table>
TABLE IV. - THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS
OF ASTM-A-1 AND AIR AT 20 ATMOSPHERES

(a) Fuel-air ratio, 0.01

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2154</td>
<td>28.823</td>
<td>826×10^{-6}</td>
<td>0.4220</td>
<td>546×10^{-6}</td>
<td>0.639</td>
<td>663.2</td>
</tr>
<tr>
<td>2700</td>
<td>1.2228</td>
<td>28.866</td>
<td>805</td>
<td>0.4010</td>
<td>494</td>
<td>.653</td>
<td>622.1</td>
</tr>
<tr>
<td>2600</td>
<td>1.2303</td>
<td>28.897</td>
<td>784</td>
<td>0.3833</td>
<td>451</td>
<td>.666</td>
<td>582.9</td>
</tr>
<tr>
<td>2500</td>
<td>1.2377</td>
<td>28.920</td>
<td>762</td>
<td>0.3685</td>
<td>416</td>
<td>.675</td>
<td>545.3</td>
</tr>
<tr>
<td>2400</td>
<td>1.2447</td>
<td>28.936</td>
<td>741</td>
<td>0.3563</td>
<td>386</td>
<td>.683</td>
<td>509.1</td>
</tr>
<tr>
<td>2300</td>
<td>1.2514</td>
<td>28.947</td>
<td>719</td>
<td>0.3461</td>
<td>361</td>
<td>.689</td>
<td>474.0</td>
</tr>
<tr>
<td>2200</td>
<td>1.2578</td>
<td>28.955</td>
<td>698</td>
<td>0.3375</td>
<td>340</td>
<td>.693</td>
<td>439.8</td>
</tr>
<tr>
<td>2100</td>
<td>1.2639</td>
<td>28.959</td>
<td>676</td>
<td>0.3303</td>
<td>321</td>
<td>.696</td>
<td>406.4</td>
</tr>
<tr>
<td>2000</td>
<td>1.2697</td>
<td>28.962</td>
<td>654</td>
<td>0.3239</td>
<td>304</td>
<td>.698</td>
<td>373.7</td>
</tr>
<tr>
<td>1900</td>
<td>1.2754</td>
<td>28.964</td>
<td>632</td>
<td>0.3183</td>
<td>288</td>
<td>.699</td>
<td>341.6</td>
</tr>
<tr>
<td>1800</td>
<td>1.2809</td>
<td>28.965</td>
<td>610</td>
<td>0.3131</td>
<td>273</td>
<td>.700</td>
<td>310.1</td>
</tr>
<tr>
<td>1700</td>
<td>1.2865</td>
<td>28.965</td>
<td>588</td>
<td>0.3082</td>
<td>258</td>
<td>.701</td>
<td>279.0</td>
</tr>
<tr>
<td>1600</td>
<td>1.2920</td>
<td>28.966</td>
<td>565</td>
<td>0.3036</td>
<td>244</td>
<td>.702</td>
<td>248.4</td>
</tr>
<tr>
<td>1500</td>
<td>1.2976</td>
<td></td>
<td>542</td>
<td>0.2991</td>
<td>231</td>
<td>.703</td>
<td>218.3</td>
</tr>
<tr>
<td>1400</td>
<td>1.3033</td>
<td></td>
<td>519</td>
<td>0.2948</td>
<td>217</td>
<td>.704</td>
<td>188.6</td>
</tr>
<tr>
<td>1300</td>
<td>1.3091</td>
<td></td>
<td>495</td>
<td>0.2905</td>
<td>204</td>
<td>.704</td>
<td>159.3</td>
</tr>
<tr>
<td>1200</td>
<td>1.3152</td>
<td></td>
<td>470</td>
<td>0.2863</td>
<td>191</td>
<td>.705</td>
<td>130.5</td>
</tr>
<tr>
<td>1100</td>
<td>1.3216</td>
<td></td>
<td>445</td>
<td>0.2819</td>
<td>178</td>
<td>.706</td>
<td>102.1</td>
</tr>
<tr>
<td>1000</td>
<td>1.3285</td>
<td></td>
<td>419</td>
<td>0.2775</td>
<td>164</td>
<td>.706</td>
<td>74.1</td>
</tr>
<tr>
<td>900</td>
<td>1.3368</td>
<td></td>
<td>391</td>
<td>0.2723</td>
<td>150</td>
<td>.707</td>
<td>46.6</td>
</tr>
<tr>
<td>800</td>
<td>1.3466</td>
<td></td>
<td>361</td>
<td>0.2665</td>
<td>136</td>
<td>.708</td>
<td>19.6</td>
</tr>
<tr>
<td>700</td>
<td>1.3576</td>
<td></td>
<td>331</td>
<td>0.2605</td>
<td>122</td>
<td>.708</td>
<td>-6.7</td>
</tr>
<tr>
<td>600</td>
<td>1.3690</td>
<td></td>
<td>298</td>
<td>0.2545</td>
<td>107</td>
<td>.708</td>
<td>-32.5</td>
</tr>
<tr>
<td>500</td>
<td>1.3800</td>
<td></td>
<td>263</td>
<td>0.2492</td>
<td>92</td>
<td>.709</td>
<td>-57.6</td>
</tr>
<tr>
<td>400</td>
<td>1.3892</td>
<td></td>
<td>225</td>
<td>0.2449</td>
<td>78</td>
<td>.709</td>
<td>-82.3</td>
</tr>
<tr>
<td>300</td>
<td>1.3328</td>
<td>29.497</td>
<td>183</td>
<td>0.2398</td>
<td>62</td>
<td>.706</td>
<td>-113.2</td>
</tr>
</tbody>
</table>

Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE IV. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 20 ATMOSPHERES

(b) Fuel-air ratio, 0.02

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2055</td>
<td>28.781</td>
<td>831×10^{-6}</td>
<td>0.4497</td>
<td>596×10^{-6}</td>
<td>0.626</td>
<td>576.6</td>
</tr>
<tr>
<td>2700</td>
<td>1.2137</td>
<td>28.837</td>
<td>809</td>
<td>0.4229</td>
<td>532</td>
<td>0.643</td>
<td>533.0</td>
</tr>
<tr>
<td>2600</td>
<td>1.2220</td>
<td>28.878</td>
<td>788</td>
<td>0.4003</td>
<td>479</td>
<td>0.658</td>
<td>491.8</td>
</tr>
<tr>
<td>2500</td>
<td>1.2301</td>
<td>28.908</td>
<td>766</td>
<td>0.3817</td>
<td>437</td>
<td>0.670</td>
<td>452.8</td>
</tr>
<tr>
<td>2400</td>
<td>1.2379</td>
<td>28.928</td>
<td>745</td>
<td>0.3667</td>
<td>402</td>
<td>0.679</td>
<td>415.4</td>
</tr>
<tr>
<td>2300</td>
<td>1.2452</td>
<td>28.943</td>
<td>723</td>
<td>0.3545</td>
<td>374</td>
<td>0.686</td>
<td>379.3</td>
</tr>
<tr>
<td>2200</td>
<td>1.2519</td>
<td>28.952</td>
<td>701</td>
<td>0.3446</td>
<td>350</td>
<td>0.691</td>
<td>344.4</td>
</tr>
<tr>
<td>2100</td>
<td>1.2582</td>
<td>28.958</td>
<td>679</td>
<td>0.3365</td>
<td>329</td>
<td>0.694</td>
<td>310.4</td>
</tr>
<tr>
<td>2000</td>
<td>1.2641</td>
<td>28.962</td>
<td>657</td>
<td>0.3296</td>
<td>311</td>
<td>0.696</td>
<td>277.1</td>
</tr>
<tr>
<td>1900</td>
<td>1.2697</td>
<td>28.964</td>
<td>635</td>
<td>0.3236</td>
<td>294</td>
<td>0.698</td>
<td>244.4</td>
</tr>
<tr>
<td>1800</td>
<td>1.2752</td>
<td>28.965</td>
<td>612</td>
<td>0.3183</td>
<td>278</td>
<td>0.700</td>
<td>212.3</td>
</tr>
<tr>
<td>1700</td>
<td>1.2805</td>
<td>28.966</td>
<td>589</td>
<td>0.3133</td>
<td>263</td>
<td>0.701</td>
<td>180.7</td>
</tr>
<tr>
<td>1600</td>
<td>1.2858</td>
<td>28.967</td>
<td>566</td>
<td>0.3087</td>
<td>249</td>
<td>0.702</td>
<td>149.6</td>
</tr>
<tr>
<td>1500</td>
<td>1.2912</td>
<td>28.962</td>
<td>543</td>
<td>0.3042</td>
<td>235</td>
<td>0.703</td>
<td>119.0</td>
</tr>
<tr>
<td>1400</td>
<td>1.2967</td>
<td>28.964</td>
<td>519</td>
<td>0.2998</td>
<td>221</td>
<td>0.704</td>
<td>88.8</td>
</tr>
<tr>
<td>1300</td>
<td>1.3025</td>
<td>495</td>
<td>0.2954</td>
<td>208</td>
<td>0.705</td>
<td>59.0</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>1.3084</td>
<td>470</td>
<td>0.2910</td>
<td>194</td>
<td>0.706</td>
<td>29.7</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>1.3148</td>
<td>445</td>
<td>0.2865</td>
<td>180</td>
<td>0.706</td>
<td>8.8</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1.3218</td>
<td>418</td>
<td>0.2818</td>
<td>167</td>
<td>0.707</td>
<td>-27.6</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td>1.3301</td>
<td>390</td>
<td>0.2764</td>
<td>152</td>
<td>0.708</td>
<td>-55.5</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>1.3399</td>
<td>360</td>
<td>0.2704</td>
<td>137</td>
<td>0.709</td>
<td>-82.8</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1.3509</td>
<td>329</td>
<td>0.2641</td>
<td>122</td>
<td>0.710</td>
<td>-109.6</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.3625</td>
<td>296</td>
<td>0.2579</td>
<td>108</td>
<td>0.711</td>
<td>-135.7</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.3737</td>
<td>261</td>
<td>0.2522</td>
<td>93</td>
<td>0.712</td>
<td>-161.2</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>1.3836</td>
<td>222</td>
<td>0.2474</td>
<td>77</td>
<td>0.713</td>
<td>-186.1</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>1.3124</td>
<td>30.092</td>
<td>183</td>
<td>0.2393</td>
<td>62</td>
<td>0.706</td>
<td>-224.3</td>
</tr>
</tbody>
</table>

Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE IV. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 20 ATMOSPHERES

(c) Fuel-air ratio, 0.03

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, m</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, $k$, cal/(cm)(sec)(K)</th>
<th>Prandtl number, $Pr$</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1970</td>
<td>28.739</td>
<td>$834 \times 10^{-6}$</td>
<td>0.4778</td>
<td>$646 \times 10^{-6}$</td>
<td>0.617</td>
<td>491.4</td>
</tr>
<tr>
<td>2700</td>
<td>1.2056</td>
<td>28.808</td>
<td>813</td>
<td>0.4448</td>
<td>569</td>
<td>0.635</td>
<td>445.3</td>
</tr>
<tr>
<td>2600</td>
<td>1.2146</td>
<td>28.859</td>
<td>791</td>
<td>0.4171</td>
<td>506</td>
<td>0.652</td>
<td>402.2</td>
</tr>
<tr>
<td>2500</td>
<td>1.2236</td>
<td>28.896</td>
<td>770</td>
<td>0.3944</td>
<td>456</td>
<td>0.665</td>
<td>361.7</td>
</tr>
<tr>
<td>2400</td>
<td>1.2320</td>
<td>28.922</td>
<td>748</td>
<td>0.3764</td>
<td>417</td>
<td>0.675</td>
<td>323.2</td>
</tr>
<tr>
<td>2300</td>
<td>1.2398</td>
<td>28.939</td>
<td>726</td>
<td>0.3622</td>
<td>385</td>
<td>0.683</td>
<td>286.3</td>
</tr>
<tr>
<td>2200</td>
<td>1.2469</td>
<td>28.950</td>
<td>704</td>
<td>0.3511</td>
<td>359</td>
<td>0.689</td>
<td>250.6</td>
</tr>
<tr>
<td>2100</td>
<td>1.2533</td>
<td>28.957</td>
<td>682</td>
<td>0.3421</td>
<td>337</td>
<td>0.693</td>
<td>216.0</td>
</tr>
<tr>
<td>2000</td>
<td>1.2592</td>
<td>28.962</td>
<td>659</td>
<td>0.3348</td>
<td>317</td>
<td>0.696</td>
<td>182.1</td>
</tr>
<tr>
<td>1900</td>
<td>1.2647</td>
<td>28.965</td>
<td>637</td>
<td>0.3286</td>
<td>300</td>
<td>0.698</td>
<td>149.0</td>
</tr>
<tr>
<td>1800</td>
<td>1.2699</td>
<td>28.966</td>
<td>614</td>
<td>0.3232</td>
<td>284</td>
<td>0.699</td>
<td>116.4</td>
</tr>
<tr>
<td>1700</td>
<td>1.2751</td>
<td>28.967</td>
<td>591</td>
<td>0.3182</td>
<td>268</td>
<td>0.701</td>
<td>84.3</td>
</tr>
<tr>
<td>1600</td>
<td>1.2802</td>
<td>28.967</td>
<td>567</td>
<td>0.3135</td>
<td>254</td>
<td>0.702</td>
<td>52.7</td>
</tr>
<tr>
<td>1500</td>
<td>1.2853</td>
<td>28.968</td>
<td>544</td>
<td>0.3090</td>
<td>239</td>
<td>0.703</td>
<td>21.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2907</td>
<td>28.967</td>
<td>520</td>
<td>0.3046</td>
<td>225</td>
<td>0.704</td>
<td>-9.1</td>
</tr>
<tr>
<td>1300</td>
<td>1.2962</td>
<td>28.966</td>
<td>495</td>
<td>0.3002</td>
<td>211</td>
<td>0.705</td>
<td>-39.3</td>
</tr>
<tr>
<td>1200</td>
<td>1.3021</td>
<td>28.967</td>
<td>470</td>
<td>0.2956</td>
<td>197</td>
<td>0.706</td>
<td>-69.1</td>
</tr>
<tr>
<td>1100</td>
<td>1.3085</td>
<td>28.967</td>
<td>444</td>
<td>0.2910</td>
<td>183</td>
<td>0.707</td>
<td>-98.4</td>
</tr>
<tr>
<td>1000</td>
<td>1.3154</td>
<td>28.967</td>
<td>417</td>
<td>0.2861</td>
<td>169</td>
<td>0.709</td>
<td>-127.3</td>
</tr>
<tr>
<td>900</td>
<td>1.3238</td>
<td>28.967</td>
<td>389</td>
<td>0.2804</td>
<td>154</td>
<td>0.710</td>
<td>-155.6</td>
</tr>
<tr>
<td>800</td>
<td>1.3337</td>
<td>28.966</td>
<td>359</td>
<td>0.2742</td>
<td>139</td>
<td>0.711</td>
<td>-183.4</td>
</tr>
<tr>
<td>700</td>
<td>1.3446</td>
<td>28.967</td>
<td>328</td>
<td>0.2676</td>
<td>123</td>
<td>0.712</td>
<td>-210.4</td>
</tr>
<tr>
<td>600</td>
<td>1.3563</td>
<td>28.967</td>
<td>295</td>
<td>0.2611</td>
<td>108</td>
<td>0.713</td>
<td>-236.9</td>
</tr>
<tr>
<td>500</td>
<td>1.3678</td>
<td>28.967</td>
<td>259</td>
<td>0.2551</td>
<td>92</td>
<td>0.716</td>
<td>-262.7</td>
</tr>
<tr>
<td>400</td>
<td>1.3783</td>
<td>28.967</td>
<td>220</td>
<td>0.2499</td>
<td>77</td>
<td>0.717</td>
<td>-287.9</td>
</tr>
<tr>
<td>300</td>
<td>1.2940</td>
<td>30.699</td>
<td>182</td>
<td>0.2389</td>
<td>62</td>
<td>0.706</td>
<td>-333.2</td>
</tr>
</tbody>
</table>

aProperties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE IV. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 20 ATMOSPHERES

(d) Fuel-air ratio, 0.04

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, cp, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1889</td>
<td>28.690</td>
<td>837×10^{-6}</td>
<td>0.5094</td>
<td>701×10^{-6}</td>
<td>0.609</td>
<td>408.6</td>
</tr>
<tr>
<td>2700</td>
<td>1.1978</td>
<td>28.775</td>
<td>816</td>
<td>0.4966</td>
<td>690</td>
<td>0.612</td>
<td>399.7</td>
</tr>
<tr>
<td>2600</td>
<td>1.2074</td>
<td>28.838</td>
<td>794</td>
<td>0.4835</td>
<td>656</td>
<td>0.606</td>
<td>368.4</td>
</tr>
<tr>
<td>2500</td>
<td>1.2172</td>
<td>28.883</td>
<td>772</td>
<td>0.4703</td>
<td>633</td>
<td>0.600</td>
<td>337.3</td>
</tr>
<tr>
<td>2400</td>
<td>1.2264</td>
<td>28.914</td>
<td>752</td>
<td>0.4575</td>
<td>611</td>
<td>0.594</td>
<td>306.2</td>
</tr>
<tr>
<td>2300</td>
<td>1.2348</td>
<td>28.935</td>
<td>728</td>
<td>0.4450</td>
<td>591</td>
<td>0.588</td>
<td>275.3</td>
</tr>
<tr>
<td>2200</td>
<td>1.2423</td>
<td>28.949</td>
<td>706</td>
<td>0.4327</td>
<td>571</td>
<td>0.582</td>
<td>244.5</td>
</tr>
<tr>
<td>2100</td>
<td>1.2489</td>
<td>28.957</td>
<td>684</td>
<td>0.4207</td>
<td>552</td>
<td>0.576</td>
<td>213.8</td>
</tr>
<tr>
<td>2000</td>
<td>1.2548</td>
<td>28.962</td>
<td>661</td>
<td>0.4093</td>
<td>533</td>
<td>0.570</td>
<td>183.3</td>
</tr>
<tr>
<td>1900</td>
<td>1.2602</td>
<td>28.965</td>
<td>638</td>
<td>0.3979</td>
<td>514</td>
<td>0.564</td>
<td>153.0</td>
</tr>
<tr>
<td>1800</td>
<td>1.2652</td>
<td>28.967</td>
<td>615</td>
<td>0.3870</td>
<td>495</td>
<td>0.558</td>
<td>122.9</td>
</tr>
<tr>
<td>1700</td>
<td>1.2701</td>
<td>28.968</td>
<td>592</td>
<td>0.3764</td>
<td>476</td>
<td>0.552</td>
<td>92.9</td>
</tr>
<tr>
<td>1600</td>
<td>1.2749</td>
<td>28.968</td>
<td>568</td>
<td>0.3659</td>
<td>458</td>
<td>0.546</td>
<td>62.9</td>
</tr>
<tr>
<td>1500</td>
<td>1.2799</td>
<td>28.969</td>
<td>544</td>
<td>0.3556</td>
<td>440</td>
<td>0.540</td>
<td>32.9</td>
</tr>
<tr>
<td>1400</td>
<td>1.2850</td>
<td>28.969</td>
<td>520</td>
<td>0.3456</td>
<td>422</td>
<td>0.534</td>
<td>2.30</td>
</tr>
<tr>
<td>1300</td>
<td>1.2904</td>
<td>28.968</td>
<td>500</td>
<td>0.3359</td>
<td>404</td>
<td>0.528</td>
<td>-133.8</td>
</tr>
<tr>
<td>1200</td>
<td>1.2962</td>
<td>28.967</td>
<td>470</td>
<td>0.3265</td>
<td>387</td>
<td>0.522</td>
<td>-266.0</td>
</tr>
<tr>
<td>1100</td>
<td>1.3025</td>
<td>28.966</td>
<td>444</td>
<td>0.3175</td>
<td>370</td>
<td>0.516</td>
<td>-398.8</td>
</tr>
<tr>
<td>1000</td>
<td>1.3085</td>
<td>28.964</td>
<td>416</td>
<td>0.3086</td>
<td>353</td>
<td>0.510</td>
<td>-531.6</td>
</tr>
<tr>
<td>900</td>
<td>1.3179</td>
<td>28.962</td>
<td>388</td>
<td>0.2998</td>
<td>336</td>
<td>0.504</td>
<td>-664.3</td>
</tr>
<tr>
<td>800</td>
<td>1.3277</td>
<td>28.959</td>
<td>360</td>
<td>0.2914</td>
<td>320</td>
<td>0.498</td>
<td>-797.1</td>
</tr>
<tr>
<td>700</td>
<td>1.3373</td>
<td>28.955</td>
<td>332</td>
<td>0.2831</td>
<td>304</td>
<td>0.492</td>
<td>-929.0</td>
</tr>
<tr>
<td>600</td>
<td>1.3472</td>
<td>28.951</td>
<td>304</td>
<td>0.2750</td>
<td>288</td>
<td>0.486</td>
<td>-1062.0</td>
</tr>
<tr>
<td>500</td>
<td>1.3572</td>
<td>28.946</td>
<td>277</td>
<td>0.2672</td>
<td>272</td>
<td>0.480</td>
<td>-1196.0</td>
</tr>
<tr>
<td>400</td>
<td>1.3672</td>
<td>28.941</td>
<td>250</td>
<td>0.2596</td>
<td>256</td>
<td>0.474</td>
<td>-1330.0</td>
</tr>
<tr>
<td>300</td>
<td>1.3773</td>
<td>28.936</td>
<td>224</td>
<td>0.2523</td>
<td>240</td>
<td>0.468</td>
<td>-1465.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
TABLE IV. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 20 ATMOSPHERES

(e) Fuel-air ratio, 0.05

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, ( \gamma )</th>
<th>Molecular weight, m</th>
<th>Viscosity, ( \mu ), g/(cm)(sec)</th>
<th>Specific heat at constant pressure, ( c_p ), cal/(g)(K)</th>
<th>Thermal conductivity, ( k ), cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1805</td>
<td>28.625</td>
<td>840 \times 10^{-6}</td>
<td>0.5483</td>
<td>765 \times 10^{-6}</td>
<td>0.601</td>
<td>329.7</td>
</tr>
<tr>
<td>2700</td>
<td>1.1894</td>
<td>28.730</td>
<td>818</td>
<td>0.5012</td>
<td>660</td>
<td>0.621</td>
<td>277.3</td>
</tr>
<tr>
<td>2600</td>
<td>1.1995</td>
<td>28.809</td>
<td>797</td>
<td>0.4600</td>
<td>573</td>
<td>0.639</td>
<td>229.3</td>
</tr>
<tr>
<td>2500</td>
<td>1.2100</td>
<td>28.865</td>
<td>775</td>
<td>0.4258</td>
<td>504</td>
<td>0.655</td>
<td>185.1</td>
</tr>
<tr>
<td>2400</td>
<td>1.2203</td>
<td>28.904</td>
<td>753</td>
<td>0.3990</td>
<td>450</td>
<td>0.668</td>
<td>143.9</td>
</tr>
<tr>
<td>2300</td>
<td>1.2297</td>
<td>28.930</td>
<td>730</td>
<td>0.3787</td>
<td>408</td>
<td>0.678</td>
<td>105.1</td>
</tr>
<tr>
<td>2200</td>
<td>1.2379</td>
<td>28.946</td>
<td>708</td>
<td>0.3636</td>
<td>376</td>
<td>0.685</td>
<td>68.0</td>
</tr>
<tr>
<td>2100</td>
<td>1.2449</td>
<td>28.956</td>
<td>685</td>
<td>0.3525</td>
<td>350</td>
<td>0.690</td>
<td>32.2</td>
</tr>
<tr>
<td>2000</td>
<td>1.2509</td>
<td>28.962</td>
<td>662</td>
<td>0.3441</td>
<td>328</td>
<td>0.694</td>
<td>-2.6</td>
</tr>
<tr>
<td>1900</td>
<td>1.2562</td>
<td>28.966</td>
<td>639</td>
<td>0.3375</td>
<td>310</td>
<td>0.697</td>
<td>-36.7</td>
</tr>
<tr>
<td>1800</td>
<td>1.2610</td>
<td>28.968</td>
<td>616</td>
<td>0.3320</td>
<td>293</td>
<td>0.699</td>
<td>-70.1</td>
</tr>
<tr>
<td>1700</td>
<td>1.2656</td>
<td>28.969</td>
<td>592</td>
<td>0.3271</td>
<td>277</td>
<td>0.700</td>
<td>-103.1</td>
</tr>
<tr>
<td>1600</td>
<td>1.2702</td>
<td>28.969</td>
<td>568</td>
<td>0.3226</td>
<td>261</td>
<td>0.702</td>
<td>-135.6</td>
</tr>
<tr>
<td>1500</td>
<td>1.2748</td>
<td>28.970</td>
<td>544</td>
<td>0.3182</td>
<td>246</td>
<td>0.703</td>
<td>-167.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2797</td>
<td></td>
<td>519</td>
<td>0.3138</td>
<td>231</td>
<td>0.705</td>
<td>-199.2</td>
</tr>
<tr>
<td>1300</td>
<td>1.2850</td>
<td></td>
<td>494</td>
<td>0.3093</td>
<td>217</td>
<td>0.706</td>
<td>-230.4</td>
</tr>
<tr>
<td>1200</td>
<td>1.2907</td>
<td></td>
<td>469</td>
<td>0.3046</td>
<td>202</td>
<td>0.707</td>
<td>-261.1</td>
</tr>
<tr>
<td>1100</td>
<td>1.2969</td>
<td></td>
<td>442</td>
<td>0.2996</td>
<td>187</td>
<td>0.709</td>
<td>-291.3</td>
</tr>
<tr>
<td>1000</td>
<td>1.3038</td>
<td></td>
<td>415</td>
<td>0.2943</td>
<td>172</td>
<td>0.711</td>
<td>-321.0</td>
</tr>
<tr>
<td>900</td>
<td>1.3122</td>
<td></td>
<td>386</td>
<td>0.2883</td>
<td>156</td>
<td>0.712</td>
<td>-350.1</td>
</tr>
<tr>
<td>800</td>
<td>1.3221</td>
<td></td>
<td>356</td>
<td>0.2816</td>
<td>140</td>
<td>0.714</td>
<td>-378.6</td>
</tr>
<tr>
<td>700</td>
<td>1.3331</td>
<td></td>
<td>324</td>
<td>0.2745</td>
<td>124</td>
<td>0.716</td>
<td>-406.4</td>
</tr>
<tr>
<td>600</td>
<td>1.3449</td>
<td></td>
<td>291</td>
<td>0.2675</td>
<td>108</td>
<td>0.718</td>
<td>-433.5</td>
</tr>
<tr>
<td>500</td>
<td>1.3568</td>
<td></td>
<td>255</td>
<td>0.2608</td>
<td>92</td>
<td>0.721</td>
<td>-459.9</td>
</tr>
<tr>
<td>400</td>
<td>1.3683</td>
<td></td>
<td>215</td>
<td>0.2548</td>
<td>76</td>
<td>0.724</td>
<td>-485.7</td>
</tr>
<tr>
<td>a300</td>
<td>1.2621</td>
<td>31.952</td>
<td>181</td>
<td>0.2379</td>
<td>61</td>
<td>0.707</td>
<td>-544.8</td>
</tr>
</tbody>
</table>

\(^a\)Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE IV. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 20 ATMOSPHERES

(f) Fuel-air ratio, 0.06

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, ( \gamma )</th>
<th>Molecular weight, ( m )</th>
<th>Viscosity, ( \mu ), g/(cm)(sec)</th>
<th>Specific heat at constant pressure, ( c_p ), cal/(g)(K)</th>
<th>Thermal conductivity, ( k ), cal/(cm)(sec)(K)</th>
<th>Prandtl number, ( \text{Pr} )</th>
<th>Enthalpy, ( h ), cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1719</td>
<td>28.516</td>
<td>( 8.41 \times 10^{-6} )</td>
<td>0.5975</td>
<td>( 8.42 \times 10^{-6} )</td>
<td>0.597</td>
<td>258.9</td>
</tr>
<tr>
<td>2700</td>
<td>1.2795</td>
<td>28.648</td>
<td>820</td>
<td>0.5465</td>
<td>728</td>
<td>0.616</td>
<td>201.7</td>
</tr>
<tr>
<td>2600</td>
<td>1.1890</td>
<td>28.752</td>
<td>798</td>
<td>0.4984</td>
<td>629</td>
<td>0.633</td>
<td>149.5</td>
</tr>
<tr>
<td>2500</td>
<td>1.1999</td>
<td>28.829</td>
<td>776</td>
<td>0.4557</td>
<td>546</td>
<td>0.648</td>
<td>101.8</td>
</tr>
<tr>
<td>2400</td>
<td>1.2115</td>
<td>28.883</td>
<td>754</td>
<td>0.4203</td>
<td>479</td>
<td>0.662</td>
<td>58.1</td>
</tr>
<tr>
<td>2300</td>
<td>1.2227</td>
<td>28.918</td>
<td>732</td>
<td>0.3929</td>
<td>427</td>
<td>0.673</td>
<td>17.5</td>
</tr>
<tr>
<td>2200</td>
<td>1.2325</td>
<td>28.941</td>
<td>709</td>
<td>0.3728</td>
<td>388</td>
<td>0.682</td>
<td>-20.8</td>
</tr>
<tr>
<td>2100</td>
<td>1.2407</td>
<td>28.954</td>
<td>686</td>
<td>0.3586</td>
<td>358</td>
<td>0.688</td>
<td>-57.3</td>
</tr>
<tr>
<td>2000</td>
<td>1.2473</td>
<td>28.962</td>
<td>663</td>
<td>0.3486</td>
<td>334</td>
<td>0.693</td>
<td>-92.6</td>
</tr>
<tr>
<td>1900</td>
<td>1.2527</td>
<td>28.966</td>
<td>640</td>
<td>0.3413</td>
<td>314</td>
<td>0.696</td>
<td>-127.1</td>
</tr>
<tr>
<td>1800</td>
<td>1.2574</td>
<td>28.969</td>
<td>616</td>
<td>0.3357</td>
<td>296</td>
<td>0.698</td>
<td>-160.9</td>
</tr>
<tr>
<td>1700</td>
<td>1.2617</td>
<td>28.970</td>
<td>592</td>
<td>0.3310</td>
<td>280</td>
<td>0.700</td>
<td>-194.3</td>
</tr>
<tr>
<td>1600</td>
<td>1.2659</td>
<td>28.970</td>
<td>568</td>
<td>0.3266</td>
<td>265</td>
<td>0.702</td>
<td>-227.1</td>
</tr>
<tr>
<td>1500</td>
<td>1.2703</td>
<td>28.970</td>
<td>544</td>
<td>0.3224</td>
<td>249</td>
<td>0.703</td>
<td>-259.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2749</td>
<td>28.971</td>
<td>519</td>
<td>0.3181</td>
<td>234</td>
<td>0.705</td>
<td>-291.6</td>
</tr>
<tr>
<td>1300</td>
<td>1.2799</td>
<td>28.971</td>
<td>494</td>
<td>0.3136</td>
<td>219</td>
<td>0.706</td>
<td>-323.2</td>
</tr>
<tr>
<td>1200</td>
<td>1.2855</td>
<td>28.970</td>
<td>468</td>
<td>0.3089</td>
<td>204</td>
<td>0.708</td>
<td>-354.3</td>
</tr>
<tr>
<td>1100</td>
<td>1.2916</td>
<td>28.969</td>
<td>441</td>
<td>0.3038</td>
<td>189</td>
<td>0.710</td>
<td>-385.0</td>
</tr>
<tr>
<td>1000</td>
<td>1.2985</td>
<td>28.967</td>
<td>414</td>
<td>0.2983</td>
<td>173</td>
<td>0.712</td>
<td>-415.1</td>
</tr>
<tr>
<td>900</td>
<td>1.3069</td>
<td>28.959</td>
<td>385</td>
<td>0.2921</td>
<td>157</td>
<td>0.714</td>
<td>-444.6</td>
</tr>
<tr>
<td>800</td>
<td>1.3167</td>
<td>28.940</td>
<td>354</td>
<td>0.2852</td>
<td>141</td>
<td>0.716</td>
<td>-473.5</td>
</tr>
<tr>
<td>700</td>
<td>1.3277</td>
<td>28.889</td>
<td>322</td>
<td>0.2779</td>
<td>125</td>
<td>0.718</td>
<td>-501.6</td>
</tr>
<tr>
<td>600</td>
<td>1.3396</td>
<td>28.772</td>
<td>288</td>
<td>0.2706</td>
<td>108</td>
<td>0.721</td>
<td>-529.1</td>
</tr>
<tr>
<td>500</td>
<td>1.3518</td>
<td>28.660</td>
<td>252</td>
<td>0.2636</td>
<td>92</td>
<td>0.724</td>
<td>-555.8</td>
</tr>
<tr>
<td>400</td>
<td>1.3637</td>
<td>28.534</td>
<td>212</td>
<td>0.2572</td>
<td>75</td>
<td>0.728</td>
<td>-581.8</td>
</tr>
<tr>
<td>300</td>
<td>1.2482</td>
<td>28.258</td>
<td>180</td>
<td>0.2374</td>
<td>61</td>
<td>0.707</td>
<td>-647.6</td>
</tr>
</tbody>
</table>

Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE IV. - Concluded. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 20 ATMOSPHERES

(g) Fuel-air ratio, 0.06817 (stoichiometric)

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, cp, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1675</td>
<td>28.341</td>
<td>842×10⁻⁶</td>
<td>0.6293</td>
<td>883×10⁻⁶</td>
<td>0.600</td>
<td>215.5</td>
</tr>
<tr>
<td>2700</td>
<td>1.1733</td>
<td>28.491</td>
<td>820</td>
<td>0.5821</td>
<td>771</td>
<td>0.620</td>
<td>154.9</td>
</tr>
<tr>
<td>2600</td>
<td>1.1805</td>
<td>28.615</td>
<td>799</td>
<td>0.5373</td>
<td>674</td>
<td>0.637</td>
<td>99.0</td>
</tr>
<tr>
<td>2500</td>
<td>1.1889</td>
<td>28.715</td>
<td>777</td>
<td>0.4961</td>
<td>592</td>
<td>0.651</td>
<td>47.3</td>
</tr>
<tr>
<td>2400</td>
<td>1.1984</td>
<td>28.792</td>
<td>755</td>
<td>0.4597</td>
<td>524</td>
<td>0.663</td>
<td>-4.6</td>
</tr>
<tr>
<td>2300</td>
<td>1.2085</td>
<td>28.851</td>
<td>732</td>
<td>0.4284</td>
<td>467</td>
<td>0.672</td>
<td>-44.8</td>
</tr>
<tr>
<td>2200</td>
<td>1.2186</td>
<td>28.893</td>
<td>710</td>
<td>0.4025</td>
<td>420</td>
<td>0.679</td>
<td>-86.3</td>
</tr>
<tr>
<td>2100</td>
<td>1.2284</td>
<td>28.923</td>
<td>687</td>
<td>0.3816</td>
<td>382</td>
<td>0.685</td>
<td>-125.4</td>
</tr>
<tr>
<td>2000</td>
<td>1.2372</td>
<td>28.943</td>
<td>663</td>
<td>0.3653</td>
<td>351</td>
<td>0.690</td>
<td>-162.7</td>
</tr>
<tr>
<td>1900</td>
<td>1.2450</td>
<td>28.955</td>
<td>640</td>
<td>0.3529</td>
<td>326</td>
<td>0.693</td>
<td>-198.6</td>
</tr>
<tr>
<td>1800</td>
<td>1.2517</td>
<td>28.963</td>
<td>616</td>
<td>0.3435</td>
<td>304</td>
<td>0.696</td>
<td>-233.4</td>
</tr>
<tr>
<td>1700</td>
<td>1.2573</td>
<td>28.967</td>
<td>592</td>
<td>0.3363</td>
<td>285</td>
<td>0.699</td>
<td>-267.4</td>
</tr>
<tr>
<td>1600</td>
<td>1.2623</td>
<td>28.970</td>
<td>568</td>
<td>0.3306</td>
<td>268</td>
<td>0.701</td>
<td>-300.7</td>
</tr>
<tr>
<td>1500</td>
<td>1.2669</td>
<td>28.971</td>
<td>543</td>
<td>0.3258</td>
<td>252</td>
<td>0.703</td>
<td>-333.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2715</td>
<td>28.955</td>
<td>518</td>
<td>0.3213</td>
<td>236</td>
<td>0.705</td>
<td>-365.9</td>
</tr>
<tr>
<td>1300</td>
<td>1.2764</td>
<td>493</td>
<td>518</td>
<td>0.3168</td>
<td>221</td>
<td>0.707</td>
<td>-397.8</td>
</tr>
<tr>
<td>1200</td>
<td>1.2817</td>
<td>467</td>
<td>3121</td>
<td>206</td>
<td>0.709</td>
<td>-429.3</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>1.2877</td>
<td>440</td>
<td>3070</td>
<td>190</td>
<td>0.711</td>
<td>-460.2</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1.2945</td>
<td>412</td>
<td>3015</td>
<td>174</td>
<td>0.713</td>
<td>-490.6</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td>1.3028</td>
<td>383</td>
<td>2951</td>
<td>158</td>
<td>0.715</td>
<td>-520.5</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>1.3126</td>
<td>352</td>
<td>2880</td>
<td>142</td>
<td>0.717</td>
<td>-549.6</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1.3236</td>
<td>320</td>
<td>2806</td>
<td>125</td>
<td>0.720</td>
<td>-578.1</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.3354</td>
<td>286</td>
<td>2731</td>
<td>108</td>
<td>0.723</td>
<td>-605.8</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.3478</td>
<td>250</td>
<td>2658</td>
<td>91</td>
<td>0.726</td>
<td>-632.7</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>1.3608</td>
<td>211</td>
<td>2577</td>
<td>75</td>
<td>0.729</td>
<td>-662.7</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>1.3716</td>
<td>180</td>
<td>2389</td>
<td>60</td>
<td>0.707</td>
<td>-730.1</td>
<td></td>
</tr>
</tbody>
</table>

aProperties at this temperature reflect the effect of the condensation of water from the combustion products.
<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, ( \gamma )</th>
<th>Molecular weight, m</th>
<th>Viscosity, ( \mu ), g/(cm)(sec)</th>
<th>Specific heat at constant pressure, ( c_p ), cal/(g)(K)</th>
<th>Thermal conductivity, ( k ), cal/(cm)(sec)(K)</th>
<th>Prandtl number, ( Pr )</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2194</td>
<td>28.846</td>
<td>826x10^{-6}</td>
<td>0.4100</td>
<td>523x10^{-6}</td>
<td>0.648</td>
<td>659.8</td>
</tr>
<tr>
<td>2700</td>
<td>1.2263</td>
<td>28.881</td>
<td>805</td>
<td>0.3921</td>
<td>478</td>
<td>0.661</td>
<td>619.7</td>
</tr>
<tr>
<td>2600</td>
<td>1.2332</td>
<td>28.908</td>
<td>784</td>
<td>0.3768</td>
<td>440</td>
<td>0.671</td>
<td>581.3</td>
</tr>
<tr>
<td>2500</td>
<td>1.2399</td>
<td>28.927</td>
<td>762</td>
<td>0.3639</td>
<td>408</td>
<td>0.679</td>
<td>544.2</td>
</tr>
<tr>
<td>2400</td>
<td>1.2464</td>
<td>28.941</td>
<td>741</td>
<td>0.3531</td>
<td>382</td>
<td>0.686</td>
<td>508.4</td>
</tr>
<tr>
<td>2300</td>
<td>1.2527</td>
<td>28.950</td>
<td>719</td>
<td>0.3440</td>
<td>358</td>
<td>0.690</td>
<td>473.6</td>
</tr>
<tr>
<td>2200</td>
<td>1.2587</td>
<td>28.966</td>
<td>698</td>
<td>0.3362</td>
<td>338</td>
<td>0.694</td>
<td>439.6</td>
</tr>
<tr>
<td>2100</td>
<td>1.2645</td>
<td>28.960</td>
<td>676</td>
<td>0.3294</td>
<td>320</td>
<td>0.696</td>
<td>406.3</td>
</tr>
<tr>
<td>2000</td>
<td>1.2701</td>
<td>28.963</td>
<td>654</td>
<td>0.3234</td>
<td>303</td>
<td>0.698</td>
<td>373.6</td>
</tr>
<tr>
<td>1900</td>
<td>1.2756</td>
<td>28.964</td>
<td>632</td>
<td>0.3180</td>
<td>287</td>
<td>0.699</td>
<td>341.6</td>
</tr>
<tr>
<td>1800</td>
<td>1.2811</td>
<td>28.965</td>
<td>610</td>
<td>0.3129</td>
<td>272</td>
<td>0.701</td>
<td>310.0</td>
</tr>
<tr>
<td>1700</td>
<td>1.2865</td>
<td>28.965</td>
<td>588</td>
<td>0.3081</td>
<td>258</td>
<td>0.702</td>
<td>279.0</td>
</tr>
<tr>
<td>1600</td>
<td>1.2920</td>
<td>28.968</td>
<td>565</td>
<td>0.3036</td>
<td>244</td>
<td>0.703</td>
<td>248.4</td>
</tr>
<tr>
<td>1500</td>
<td>1.2976</td>
<td>28.963</td>
<td>542</td>
<td>0.2991</td>
<td>231</td>
<td>0.703</td>
<td>218.3</td>
</tr>
<tr>
<td>1400</td>
<td>1.3033</td>
<td>28.964</td>
<td>519</td>
<td>0.2948</td>
<td>217</td>
<td>0.704</td>
<td>188.6</td>
</tr>
<tr>
<td>1300</td>
<td>1.3091</td>
<td>28.965</td>
<td>495</td>
<td>0.2905</td>
<td>204</td>
<td>0.704</td>
<td>159.3</td>
</tr>
<tr>
<td>1200</td>
<td>1.3152</td>
<td>28.968</td>
<td>470</td>
<td>0.2863</td>
<td>191</td>
<td>0.705</td>
<td>130.5</td>
</tr>
<tr>
<td>1100</td>
<td>1.3216</td>
<td>28.963</td>
<td>445</td>
<td>0.2819</td>
<td>178</td>
<td>0.706</td>
<td>102.1</td>
</tr>
<tr>
<td>1000</td>
<td>1.3285</td>
<td>28.964</td>
<td>419</td>
<td>0.2775</td>
<td>164</td>
<td>0.706</td>
<td>74.1</td>
</tr>
<tr>
<td>900</td>
<td>1.3368</td>
<td>28.965</td>
<td>391</td>
<td>0.2723</td>
<td>150</td>
<td>0.707</td>
<td>46.6</td>
</tr>
<tr>
<td>800</td>
<td>1.3466</td>
<td>28.966</td>
<td>361</td>
<td>0.2665</td>
<td>136</td>
<td>0.708</td>
<td>19.6</td>
</tr>
<tr>
<td>700</td>
<td>1.3576</td>
<td>28.966</td>
<td>331</td>
<td>0.2605</td>
<td>122</td>
<td>0.708</td>
<td>7.6</td>
</tr>
<tr>
<td>600</td>
<td>1.3690</td>
<td>28.965</td>
<td>298</td>
<td>0.2545</td>
<td>107</td>
<td>0.708</td>
<td>-12.5</td>
</tr>
<tr>
<td>500</td>
<td>1.3799</td>
<td>28.964</td>
<td>263</td>
<td>0.2492</td>
<td>92</td>
<td>0.709</td>
<td>-57.6</td>
</tr>
<tr>
<td>400</td>
<td>1.3892</td>
<td>28.965</td>
<td>225</td>
<td>0.2449</td>
<td>78</td>
<td>0.709</td>
<td>-82.3</td>
</tr>
<tr>
<td>300</td>
<td>1.3440</td>
<td>29.514</td>
<td>183</td>
<td>2.398</td>
<td>62</td>
<td>0.706</td>
<td>-113.4</td>
</tr>
</tbody>
</table>

\( ^a \)Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE V. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 30 ATMOSPHERES

(b) Fuel-air ratio, 0.02

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, m</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2101</td>
<td>28.810</td>
<td>$831 \times 10^{-6}$</td>
<td>0.4342</td>
<td>566 $\times 10^{-6}$</td>
<td>0.637</td>
<td>572.1</td>
</tr>
<tr>
<td>2700</td>
<td>1.2177</td>
<td>28.857</td>
<td>809</td>
<td>0.4111</td>
<td>510</td>
<td>0.652</td>
<td>529.9</td>
</tr>
<tr>
<td>2600</td>
<td>1.2254</td>
<td>28.891</td>
<td>788</td>
<td>0.3917</td>
<td>465</td>
<td>0.664</td>
<td>489.7</td>
</tr>
<tr>
<td>2500</td>
<td>1.2329</td>
<td>28.916</td>
<td>766</td>
<td>0.3757</td>
<td>427</td>
<td>0.674</td>
<td>451.4</td>
</tr>
<tr>
<td>2400</td>
<td>1.2400</td>
<td>28.934</td>
<td>745</td>
<td>0.3626</td>
<td>396</td>
<td>0.682</td>
<td>414.5</td>
</tr>
<tr>
<td>2300</td>
<td>1.2467</td>
<td>28.946</td>
<td>723</td>
<td>0.3518</td>
<td>370</td>
<td>0.688</td>
<td>378.8</td>
</tr>
<tr>
<td>2200</td>
<td>1.2530</td>
<td>28.954</td>
<td>701</td>
<td>0.3429</td>
<td>347</td>
<td>0.692</td>
<td>344.1</td>
</tr>
<tr>
<td>2100</td>
<td>1.2589</td>
<td>28.959</td>
<td>679</td>
<td>0.3354</td>
<td>328</td>
<td>0.695</td>
<td>310.2</td>
</tr>
<tr>
<td>2000</td>
<td>1.2646</td>
<td>28.963</td>
<td>657</td>
<td>0.3290</td>
<td>310</td>
<td>0.697</td>
<td>276.9</td>
</tr>
<tr>
<td>1900</td>
<td>1.2700</td>
<td>28.965</td>
<td>635</td>
<td>0.3233</td>
<td>294</td>
<td>0.699</td>
<td>244.3</td>
</tr>
<tr>
<td>1800</td>
<td>1.2753</td>
<td>28.966</td>
<td>612</td>
<td>0.3161</td>
<td>278</td>
<td>0.700</td>
<td>212.3</td>
</tr>
<tr>
<td>1700</td>
<td>1.2806</td>
<td>28.966</td>
<td>589</td>
<td>0.3132</td>
<td>263</td>
<td>0.701</td>
<td>180.7</td>
</tr>
<tr>
<td>1600</td>
<td>1.2859</td>
<td>28.967</td>
<td>566</td>
<td>0.3086</td>
<td>249</td>
<td>0.702</td>
<td>149.6</td>
</tr>
<tr>
<td>1500</td>
<td>1.2913</td>
<td>28.967</td>
<td>543</td>
<td>0.3041</td>
<td>235</td>
<td>0.703</td>
<td>119.0</td>
</tr>
<tr>
<td>1400</td>
<td>1.2968</td>
<td>28.968</td>
<td>519</td>
<td>0.2998</td>
<td>221</td>
<td>0.704</td>
<td>88.8</td>
</tr>
<tr>
<td>1300</td>
<td>1.3024</td>
<td>495</td>
<td>$2954$</td>
<td>208</td>
<td>0.705</td>
<td>59.0</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>1.3084</td>
<td>470</td>
<td>2910</td>
<td>194</td>
<td>0.706</td>
<td>29.7</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>1.3148</td>
<td>445</td>
<td>2865</td>
<td>180</td>
<td>0.706</td>
<td>8.</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1.3217</td>
<td>418</td>
<td>2818</td>
<td>167</td>
<td>0.707</td>
<td>-27.6</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td>1.3301</td>
<td>390</td>
<td>2764</td>
<td>152</td>
<td>0.708</td>
<td>-55.5</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>1.3399</td>
<td>360</td>
<td>2704</td>
<td>137</td>
<td>0.709</td>
<td>-82.8</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1.3509</td>
<td>329</td>
<td>2641</td>
<td>122</td>
<td>0.710</td>
<td>-109.6</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.3625</td>
<td>296</td>
<td>2579</td>
<td>108</td>
<td>0.711</td>
<td>-135.7</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.3737</td>
<td>261</td>
<td>2522</td>
<td>93</td>
<td>0.712</td>
<td>-161.2</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>1.3836</td>
<td>222</td>
<td>2474</td>
<td>77</td>
<td>0.713</td>
<td>-186.1</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>1.3219</td>
<td>30.110</td>
<td>183</td>
<td>0.2393</td>
<td>62</td>
<td>0.706</td>
<td>-224.5</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
TABLE V. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 30 ATMOSPHERES

(c) Fuel-air ratio, 0.03

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, m</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, $k$, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, $h$, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2020</td>
<td>28.774</td>
<td>834×10^{-6}</td>
<td>0.4585</td>
<td>608×10^{-6}</td>
<td>0.629</td>
<td>485.8</td>
</tr>
<tr>
<td>2700</td>
<td>1.2102</td>
<td>28.833</td>
<td>813</td>
<td>.4301</td>
<td>542</td>
<td>.645</td>
<td>441.4</td>
</tr>
<tr>
<td>2600</td>
<td>1.2186</td>
<td>28.876</td>
<td>791</td>
<td>.4064</td>
<td>488</td>
<td>.659</td>
<td>399.6</td>
</tr>
<tr>
<td>2500</td>
<td>1.2268</td>
<td>28.907</td>
<td>770</td>
<td>.3869</td>
<td>444</td>
<td>.670</td>
<td>360.0</td>
</tr>
<tr>
<td>2400</td>
<td>1.2345</td>
<td>28.926</td>
<td>748</td>
<td>.3713</td>
<td>409</td>
<td>.679</td>
<td>322.1</td>
</tr>
<tr>
<td>2300</td>
<td>1.2416</td>
<td>28.943</td>
<td>726</td>
<td>.3589</td>
<td>380</td>
<td>.686</td>
<td>285.6</td>
</tr>
<tr>
<td>2200</td>
<td>1.2481</td>
<td>28.953</td>
<td>704</td>
<td>.3490</td>
<td>356</td>
<td>.690</td>
<td>250.2</td>
</tr>
<tr>
<td>2100</td>
<td>1.2541</td>
<td>28.959</td>
<td>682</td>
<td>.3408</td>
<td>335</td>
<td>.694</td>
<td>215.8</td>
</tr>
<tr>
<td>2000</td>
<td>1.2597</td>
<td>28.963</td>
<td>659</td>
<td>.3341</td>
<td>316</td>
<td>.696</td>
<td>182.0</td>
</tr>
<tr>
<td>1900</td>
<td>1.2650</td>
<td>28.965</td>
<td>637</td>
<td>.3282</td>
<td>299</td>
<td>.698</td>
<td>148.9</td>
</tr>
<tr>
<td>1800</td>
<td>1.2701</td>
<td>28.966</td>
<td>614</td>
<td>.3229</td>
<td>283</td>
<td>.699</td>
<td>116.4</td>
</tr>
<tr>
<td>1700</td>
<td>1.2752</td>
<td>28.967</td>
<td>591</td>
<td>.3181</td>
<td>268</td>
<td>.701</td>
<td>84.3</td>
</tr>
<tr>
<td>1600</td>
<td>1.2802</td>
<td>28.968</td>
<td>567</td>
<td>.3135</td>
<td>253</td>
<td>.702</td>
<td>52.7</td>
</tr>
<tr>
<td>1500</td>
<td>1.2854</td>
<td>28.968</td>
<td>544</td>
<td>.3090</td>
<td>239</td>
<td>.703</td>
<td>21.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2907</td>
<td>28.969</td>
<td>520</td>
<td>.3046</td>
<td>225</td>
<td>.704</td>
<td>-9.1</td>
</tr>
<tr>
<td>1300</td>
<td>1.2962</td>
<td>28.969</td>
<td>495</td>
<td>.3002</td>
<td>211</td>
<td>.705</td>
<td>-39.3</td>
</tr>
<tr>
<td>1200</td>
<td>1.3021</td>
<td>28.969</td>
<td>470</td>
<td>.2956</td>
<td>197</td>
<td>.706</td>
<td>-69.1</td>
</tr>
<tr>
<td>1100</td>
<td>1.3085</td>
<td>28.969</td>
<td>444</td>
<td>.2910</td>
<td>183</td>
<td>.707</td>
<td>-98.4</td>
</tr>
<tr>
<td>1000</td>
<td>1.3154</td>
<td>28.969</td>
<td>417</td>
<td>.2861</td>
<td>169</td>
<td>.709</td>
<td>-127.3</td>
</tr>
<tr>
<td>900</td>
<td>1.3238</td>
<td>28.969</td>
<td>389</td>
<td>.2805</td>
<td>154</td>
<td>.710</td>
<td>-155.6</td>
</tr>
<tr>
<td>800</td>
<td>1.3337</td>
<td>28.969</td>
<td>359</td>
<td>.2742</td>
<td>139</td>
<td>.711</td>
<td>-183.4</td>
</tr>
<tr>
<td>700</td>
<td>1.3446</td>
<td>28.969</td>
<td>328</td>
<td>.2676</td>
<td>123</td>
<td>.712</td>
<td>-210.4</td>
</tr>
<tr>
<td>600</td>
<td>1.3563</td>
<td>28.969</td>
<td>295</td>
<td>.2611</td>
<td>108</td>
<td>.713</td>
<td>-236.9</td>
</tr>
<tr>
<td>500</td>
<td>1.3678</td>
<td>28.969</td>
<td>259</td>
<td>.2551</td>
<td>92</td>
<td>.715</td>
<td>-262.7</td>
</tr>
<tr>
<td>400</td>
<td>1.3783</td>
<td>28.969</td>
<td>220</td>
<td>.2499</td>
<td>77</td>
<td>.717</td>
<td>-287.9</td>
</tr>
<tr>
<td>300</td>
<td>1.3921</td>
<td>30.717</td>
<td>182</td>
<td>.2338</td>
<td>62</td>
<td>.706</td>
<td>-333.4</td>
</tr>
</tbody>
</table>

Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE V. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 30 ATMOSPHERES

(d) Fuel-air ratio, 0.04

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, ( \gamma )</th>
<th>Molecular weight, m</th>
<th>Viscosity, ( \mu ), g/(cm)(sec)</th>
<th>Specific heat at constant pressure, ( c_p ), cal/(g)(K)</th>
<th>Thermal conductivity, ( k ), cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, ( h ), cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1942</td>
<td>28.734</td>
<td>837 x 10^{-6}</td>
<td>0.4860</td>
<td>655 x 10^{-6}</td>
<td>0.621</td>
<td>401.7</td>
</tr>
<tr>
<td>2700</td>
<td>1.2029</td>
<td>28.805</td>
<td>816</td>
<td>.4515</td>
<td>577</td>
<td>.639</td>
<td>354.9</td>
</tr>
<tr>
<td>2600</td>
<td>1.2119</td>
<td>28.858</td>
<td>794</td>
<td>.4224</td>
<td>513</td>
<td>.654</td>
<td>311.2</td>
</tr>
<tr>
<td>2500</td>
<td>1.2209</td>
<td>28.896</td>
<td>772</td>
<td>.3989</td>
<td>462</td>
<td>.666</td>
<td>270.2</td>
</tr>
<tr>
<td>2400</td>
<td>1.2293</td>
<td>28.922</td>
<td>751</td>
<td>.3803</td>
<td>422</td>
<td>.676</td>
<td>231.3</td>
</tr>
<tr>
<td>2300</td>
<td>1.2369</td>
<td>28.940</td>
<td>728</td>
<td>.3658</td>
<td>390</td>
<td>.683</td>
<td>194.0</td>
</tr>
<tr>
<td>2200</td>
<td>1.2438</td>
<td>28.951</td>
<td>706</td>
<td>.3546</td>
<td>364</td>
<td>.689</td>
<td>158.0</td>
</tr>
<tr>
<td>2100</td>
<td>1.2499</td>
<td>28.959</td>
<td>684</td>
<td>.3458</td>
<td>341</td>
<td>.693</td>
<td>123.0</td>
</tr>
<tr>
<td>2000</td>
<td>1.2554</td>
<td>28.963</td>
<td>661</td>
<td>.3387</td>
<td>322</td>
<td>.695</td>
<td>88.8</td>
</tr>
<tr>
<td>1900</td>
<td>1.2605</td>
<td>28.966</td>
<td>638</td>
<td>.3327</td>
<td>304</td>
<td>.697</td>
<td>55.2</td>
</tr>
<tr>
<td>1800</td>
<td>1.2654</td>
<td>28.967</td>
<td>615</td>
<td>.3275</td>
<td>288</td>
<td>.699</td>
<td>22.2</td>
</tr>
<tr>
<td>1700</td>
<td>1.2702</td>
<td>28.968</td>
<td>592</td>
<td>.3227</td>
<td>273</td>
<td>.701</td>
<td>-10.3</td>
</tr>
<tr>
<td>1600</td>
<td>1.2750</td>
<td>28.966</td>
<td>568</td>
<td>.3181</td>
<td>258</td>
<td>.702</td>
<td>-42.3</td>
</tr>
<tr>
<td>1500</td>
<td>1.2799</td>
<td>28.969</td>
<td>544</td>
<td>.3137</td>
<td>243</td>
<td>.703</td>
<td>-73.9</td>
</tr>
<tr>
<td>1400</td>
<td>1.2850</td>
<td>28.966</td>
<td>520</td>
<td>.3093</td>
<td>228</td>
<td>.704</td>
<td>-105.0</td>
</tr>
<tr>
<td>1300</td>
<td>1.2904</td>
<td>28.967</td>
<td>495</td>
<td>.3048</td>
<td>214</td>
<td>.705</td>
<td>-135.8</td>
</tr>
<tr>
<td>1200</td>
<td>1.2962</td>
<td>28.968</td>
<td>470</td>
<td>.3002</td>
<td>199</td>
<td>.707</td>
<td>-166.0</td>
</tr>
<tr>
<td>1100</td>
<td>1.3025</td>
<td>28.966</td>
<td>444</td>
<td>.2954</td>
<td>185</td>
<td>.708</td>
<td>-195.8</td>
</tr>
<tr>
<td>1000</td>
<td>1.3095</td>
<td>28.969</td>
<td>416</td>
<td>.2903</td>
<td>170</td>
<td>.710</td>
<td>-225.1</td>
</tr>
<tr>
<td>900</td>
<td>1.3179</td>
<td>28.966</td>
<td>388</td>
<td>.2844</td>
<td>155</td>
<td>.711</td>
<td>-253.8</td>
</tr>
<tr>
<td>800</td>
<td>1.3277</td>
<td>358</td>
<td>.2779</td>
<td>140</td>
<td>.713</td>
<td>-281.9</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1.3387</td>
<td>326</td>
<td>.2711</td>
<td>124</td>
<td>.714</td>
<td>-309.4</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.3504</td>
<td>293</td>
<td>.2644</td>
<td>108</td>
<td>.716</td>
<td>-336.2</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.3622</td>
<td>257</td>
<td>.2580</td>
<td>92</td>
<td>.718</td>
<td>-362.3</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>1.3732</td>
<td>218</td>
<td>.2524</td>
<td>76</td>
<td>.720</td>
<td>-387.8</td>
<td></td>
</tr>
</tbody>
</table>
a300              | 1.2842                          | 31.337              | 182                         | .2383                       | 61                          | .706            | -440.2            |

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, µ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1859</td>
<td>28.678</td>
<td>840×10^-6</td>
<td>0.5205</td>
<td>712×10^-6</td>
<td>0.614</td>
<td>321.2</td>
</tr>
<tr>
<td>2700</td>
<td>1.1948</td>
<td>28.767</td>
<td>819</td>
<td>0.4790</td>
<td>620</td>
<td>0.632</td>
<td>271.3</td>
</tr>
<tr>
<td>2600</td>
<td>1.2045</td>
<td>28.834</td>
<td>797</td>
<td>0.4431</td>
<td>545</td>
<td>0.648</td>
<td>225.3</td>
</tr>
<tr>
<td>2500</td>
<td>1.2144</td>
<td>28.881</td>
<td>775</td>
<td>0.4139</td>
<td>485</td>
<td>0.662</td>
<td>182.5</td>
</tr>
<tr>
<td>2400</td>
<td>1.2238</td>
<td>28.914</td>
<td>753</td>
<td>0.3909</td>
<td>437</td>
<td>0.673</td>
<td>142.3</td>
</tr>
<tr>
<td>2300</td>
<td>1.2323</td>
<td>28.936</td>
<td>730</td>
<td>0.3735</td>
<td>401</td>
<td>0.681</td>
<td>104.1</td>
</tr>
<tr>
<td>2200</td>
<td>1.2397</td>
<td>28.950</td>
<td>708</td>
<td>0.3604</td>
<td>371</td>
<td>0.687</td>
<td>67.4</td>
</tr>
<tr>
<td>2100</td>
<td>1.2460</td>
<td>28.958</td>
<td>685</td>
<td>0.3506</td>
<td>347</td>
<td>0.692</td>
<td>31.9</td>
</tr>
<tr>
<td>2000</td>
<td>1.2516</td>
<td>28.963</td>
<td>662</td>
<td>0.3430</td>
<td>327</td>
<td>0.695</td>
<td>-2.8</td>
</tr>
<tr>
<td>1900</td>
<td>1.2566</td>
<td>28.966</td>
<td>639</td>
<td>0.3369</td>
<td>309</td>
<td>0.697</td>
<td>-36.7</td>
</tr>
<tr>
<td>1800</td>
<td>1.2612</td>
<td>28.968</td>
<td>616</td>
<td>0.3317</td>
<td>292</td>
<td>0.699</td>
<td>-70.2</td>
</tr>
<tr>
<td>1700</td>
<td>1.2657</td>
<td>28.969</td>
<td>592</td>
<td>0.3270</td>
<td>276</td>
<td>0.700</td>
<td>-103.1</td>
</tr>
<tr>
<td>1600</td>
<td>1.2702</td>
<td>28.969</td>
<td>568</td>
<td>0.3225</td>
<td>261</td>
<td>0.702</td>
<td>-135.6</td>
</tr>
<tr>
<td>1500</td>
<td>1.2749</td>
<td>28.970</td>
<td>544</td>
<td>0.3182</td>
<td>246</td>
<td>0.703</td>
<td>-167.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2798</td>
<td>28.970</td>
<td>519</td>
<td>0.3138</td>
<td>231</td>
<td>0.705</td>
<td>-199.2</td>
</tr>
<tr>
<td>1300</td>
<td>1.2850</td>
<td>28.970</td>
<td>494</td>
<td>0.3093</td>
<td>217</td>
<td>0.706</td>
<td>-230.4</td>
</tr>
<tr>
<td>1200</td>
<td>1.2906</td>
<td>28.970</td>
<td>469</td>
<td>0.3046</td>
<td>202</td>
<td>0.707</td>
<td>-261.1</td>
</tr>
<tr>
<td>1100</td>
<td>1.2969</td>
<td>28.969</td>
<td>442</td>
<td>0.2996</td>
<td>187</td>
<td>0.709</td>
<td>-291.3</td>
</tr>
<tr>
<td>1000</td>
<td>1.3038</td>
<td>28.969</td>
<td>415</td>
<td>0.2943</td>
<td>172</td>
<td>0.711</td>
<td>-321.0</td>
</tr>
<tr>
<td>900</td>
<td>1.3122</td>
<td>28.970</td>
<td>386</td>
<td>0.2883</td>
<td>156</td>
<td>0.712</td>
<td>-350.1</td>
</tr>
<tr>
<td>800</td>
<td>1.3221</td>
<td>28.970</td>
<td>356</td>
<td>0.2816</td>
<td>140</td>
<td>0.714</td>
<td>-378.6</td>
</tr>
<tr>
<td>700</td>
<td>1.3331</td>
<td>28.970</td>
<td>324</td>
<td>0.2745</td>
<td>124</td>
<td>0.716</td>
<td>-406.4</td>
</tr>
<tr>
<td>600</td>
<td>1.3449</td>
<td>28.970</td>
<td>291</td>
<td>0.2675</td>
<td>108</td>
<td>0.718</td>
<td>-433.5</td>
</tr>
<tr>
<td>500</td>
<td>1.3569</td>
<td>28.969</td>
<td>255</td>
<td>0.2608</td>
<td>92</td>
<td>0.721</td>
<td>-459.9</td>
</tr>
<tr>
<td>400</td>
<td>1.2029</td>
<td>29.509</td>
<td>217</td>
<td>0.2525</td>
<td>76</td>
<td>0.721</td>
<td>-491.7</td>
</tr>
<tr>
<td>300</td>
<td>1.2681</td>
<td>31.970</td>
<td>181</td>
<td>0.2378</td>
<td>61</td>
<td>0.706</td>
<td>-545.0</td>
</tr>
</tbody>
</table>

(a) Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE V. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 30 ATMOSPHERES

(f) Fuel-air ratio, 0.06

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1768</td>
<td>28.581</td>
<td>842×10^{-6}</td>
<td>0.5666</td>
<td>783×10^{-6}</td>
<td>0.609</td>
<td>248.2</td>
</tr>
<tr>
<td>2700</td>
<td>1.1847</td>
<td>28.696</td>
<td>820</td>
<td>.5204</td>
<td>682</td>
<td>0.626</td>
<td>193.8</td>
</tr>
<tr>
<td>2600</td>
<td>1.1943</td>
<td>28.786</td>
<td>799</td>
<td>.4773</td>
<td>594</td>
<td>0.641</td>
<td>144.0</td>
</tr>
<tr>
<td>2500</td>
<td>1.2050</td>
<td>28.851</td>
<td>777</td>
<td>.4397</td>
<td>521</td>
<td>0.655</td>
<td>98.2</td>
</tr>
<tr>
<td>2400</td>
<td>1.2159</td>
<td>28.897</td>
<td>754</td>
<td>.4090</td>
<td>463</td>
<td>0.667</td>
<td>55.8</td>
</tr>
<tr>
<td>2300</td>
<td>1.2261</td>
<td>28.927</td>
<td>732</td>
<td>.3855</td>
<td>417</td>
<td>0.677</td>
<td>16.1</td>
</tr>
<tr>
<td>2200</td>
<td>1.2349</td>
<td>28.946</td>
<td>709</td>
<td>.3683</td>
<td>382</td>
<td>0.684</td>
<td>-21.5</td>
</tr>
<tr>
<td>2100</td>
<td>1.2422</td>
<td>28.957</td>
<td>686</td>
<td>.3560</td>
<td>354</td>
<td>0.690</td>
<td>-57.7</td>
</tr>
<tr>
<td>2000</td>
<td>1.2482</td>
<td>28.963</td>
<td>663</td>
<td>.3472</td>
<td>332</td>
<td>0.694</td>
<td>-92.8</td>
</tr>
<tr>
<td>1900</td>
<td>1.2532</td>
<td>28.967</td>
<td>640</td>
<td>.3406</td>
<td>313</td>
<td>0.696</td>
<td>-127.2</td>
</tr>
<tr>
<td>1800</td>
<td>1.2576</td>
<td>28.969</td>
<td>616</td>
<td>.3354</td>
<td>296</td>
<td>0.699</td>
<td>-161.0</td>
</tr>
<tr>
<td>1700</td>
<td>1.2618</td>
<td>28.970</td>
<td>592</td>
<td>.3308</td>
<td>280</td>
<td>0.700</td>
<td>-194.3</td>
</tr>
<tr>
<td>1600</td>
<td>1.2660</td>
<td>28.970</td>
<td>568</td>
<td>.3266</td>
<td>264</td>
<td>0.702</td>
<td>-227.2</td>
</tr>
<tr>
<td>1500</td>
<td>1.2703</td>
<td>28.971</td>
<td>544</td>
<td>.3224</td>
<td>249</td>
<td>0.703</td>
<td>-259.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2749</td>
<td>28.971</td>
<td>519</td>
<td>.3181</td>
<td>234</td>
<td>0.705</td>
<td>-291.6</td>
</tr>
<tr>
<td>1300</td>
<td>1.2799</td>
<td>28.971</td>
<td>494</td>
<td>.3136</td>
<td>219</td>
<td>0.706</td>
<td>-323.2</td>
</tr>
<tr>
<td>1200</td>
<td>1.2855</td>
<td>28.970</td>
<td>468</td>
<td>.3089</td>
<td>204</td>
<td>0.708</td>
<td>-354.3</td>
</tr>
<tr>
<td>1100</td>
<td>1.2916</td>
<td>28.970</td>
<td>441</td>
<td>.3038</td>
<td>189</td>
<td>0.710</td>
<td>-385.0</td>
</tr>
<tr>
<td>1000</td>
<td>1.2985</td>
<td>28.970</td>
<td>414</td>
<td>.2984</td>
<td>173</td>
<td>0.712</td>
<td>-415.1</td>
</tr>
<tr>
<td>900</td>
<td>1.3069</td>
<td>28.970</td>
<td>385</td>
<td>.2921</td>
<td>157</td>
<td>0.714</td>
<td>-444.6</td>
</tr>
<tr>
<td>800</td>
<td>1.3167</td>
<td>28.970</td>
<td>354</td>
<td>.2852</td>
<td>141</td>
<td>0.716</td>
<td>-473.5</td>
</tr>
<tr>
<td>700</td>
<td>1.3277</td>
<td>28.970</td>
<td>322</td>
<td>.2779</td>
<td>125</td>
<td>0.718</td>
<td>-501.6</td>
</tr>
<tr>
<td>600</td>
<td>1.3396</td>
<td>28.970</td>
<td>288</td>
<td>.2706</td>
<td>108</td>
<td>0.721</td>
<td>-529.1</td>
</tr>
<tr>
<td>500</td>
<td>1.3518</td>
<td>28.970</td>
<td>252</td>
<td>.2636</td>
<td>92</td>
<td>0.724</td>
<td>-555.8</td>
</tr>
<tr>
<td>400</td>
<td>1.1980</td>
<td>30.106</td>
<td>216</td>
<td>.2525</td>
<td>75</td>
<td>0.722</td>
<td>-594.2</td>
</tr>
<tr>
<td>300</td>
<td>1.2533</td>
<td>32.616</td>
<td>180</td>
<td>.2373</td>
<td>61</td>
<td>0.707</td>
<td>-647.8</td>
</tr>
</tbody>
</table>

Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE V. - Concluded. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 30 ATMOSPHERES

(g) Fuel-air ratio, 0.06817 (stoichiometric)

<table>
<thead>
<tr>
<th>Temperature, $T$, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, $m$, g/(cm)(sec)</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, $k$, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, $h$, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1718</td>
<td>28.414</td>
<td>842x10^{-6}</td>
<td>0.5995</td>
<td>824x10^{-6}</td>
<td>0.613</td>
<td>203.4</td>
</tr>
<tr>
<td>2700</td>
<td>1.1777</td>
<td>28.547</td>
<td>821</td>
<td>0.5565</td>
<td>725</td>
<td>0.630</td>
<td>145.6</td>
</tr>
<tr>
<td>2600</td>
<td>1.1850</td>
<td>28.657</td>
<td>799</td>
<td>0.5161</td>
<td>640</td>
<td>0.645</td>
<td>92.0</td>
</tr>
<tr>
<td>2500</td>
<td>1.1934</td>
<td>28.745</td>
<td>777</td>
<td>0.4791</td>
<td>567</td>
<td>0.657</td>
<td>42.3</td>
</tr>
<tr>
<td>2400</td>
<td>1.2026</td>
<td>28.814</td>
<td>755</td>
<td>0.4464</td>
<td>505</td>
<td>0.667</td>
<td>-4.0</td>
</tr>
<tr>
<td>2300</td>
<td>1.2122</td>
<td>28.865</td>
<td>732</td>
<td>0.4185</td>
<td>454</td>
<td>0.675</td>
<td>-47.2</td>
</tr>
<tr>
<td>2200</td>
<td>1.2218</td>
<td>28.903</td>
<td>710</td>
<td>0.3954</td>
<td>412</td>
<td>0.682</td>
<td>-87.8</td>
</tr>
<tr>
<td>2100</td>
<td>1.2308</td>
<td>28.929</td>
<td>687</td>
<td>0.3768</td>
<td>377</td>
<td>0.687</td>
<td>-126.4</td>
</tr>
<tr>
<td>2000</td>
<td>1.2391</td>
<td>28.946</td>
<td>664</td>
<td>0.3622</td>
<td>348</td>
<td>0.691</td>
<td>-163.3</td>
</tr>
<tr>
<td>1900</td>
<td>1.2463</td>
<td>28.957</td>
<td>640</td>
<td>0.3509</td>
<td>324</td>
<td>0.694</td>
<td>-198.9</td>
</tr>
<tr>
<td>1800</td>
<td>1.2525</td>
<td>28.964</td>
<td>616</td>
<td>0.3424</td>
<td>303</td>
<td>0.697</td>
<td>-233.6</td>
</tr>
<tr>
<td>1700</td>
<td>1.2578</td>
<td>28.968</td>
<td>592</td>
<td>0.3357</td>
<td>284</td>
<td>0.699</td>
<td>-267.5</td>
</tr>
<tr>
<td>1600</td>
<td>1.2626</td>
<td>28.970</td>
<td>568</td>
<td>0.3303</td>
<td>268</td>
<td>0.701</td>
<td>-300.8</td>
</tr>
<tr>
<td>1500</td>
<td>1.2671</td>
<td>28.971</td>
<td>543</td>
<td>0.3256</td>
<td>252</td>
<td>0.703</td>
<td>-333.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2716</td>
<td>28.971</td>
<td>518</td>
<td>0.3212</td>
<td>236</td>
<td>0.705</td>
<td>-365.9</td>
</tr>
<tr>
<td>1300</td>
<td>1.2764</td>
<td>28.971</td>
<td>493</td>
<td>0.3168</td>
<td>221</td>
<td>0.707</td>
<td>-397.8</td>
</tr>
<tr>
<td>1200</td>
<td>1.2817</td>
<td>28.971</td>
<td>467</td>
<td>0.3121</td>
<td>206</td>
<td>0.709</td>
<td>-429.3</td>
</tr>
<tr>
<td>1100</td>
<td>1.2877</td>
<td>28.970</td>
<td>440</td>
<td>0.3070</td>
<td>190</td>
<td>0.711</td>
<td>-460.2</td>
</tr>
<tr>
<td>1000</td>
<td>1.2945</td>
<td>28.971</td>
<td>412</td>
<td>0.3015</td>
<td>174</td>
<td>0.713</td>
<td>-490.6</td>
</tr>
<tr>
<td>900</td>
<td>1.3028</td>
<td>28.971</td>
<td>383</td>
<td>0.2951</td>
<td>158</td>
<td>0.715</td>
<td>-520.5</td>
</tr>
<tr>
<td>800</td>
<td>1.3126</td>
<td>28.971</td>
<td>352</td>
<td>0.2880</td>
<td>142</td>
<td>0.717</td>
<td>-549.7</td>
</tr>
<tr>
<td>700</td>
<td>1.3236</td>
<td>28.971</td>
<td>320</td>
<td>0.2806</td>
<td>125</td>
<td>0.720</td>
<td>-578.1</td>
</tr>
<tr>
<td>600</td>
<td>1.3354</td>
<td>28.971</td>
<td>286</td>
<td>0.2731</td>
<td>108</td>
<td>0.723</td>
<td>-605.8</td>
</tr>
<tr>
<td>500</td>
<td>1.3478</td>
<td>28.971</td>
<td>250</td>
<td>0.2658</td>
<td>91</td>
<td>0.726</td>
<td>-632.7</td>
</tr>
<tr>
<td>a400</td>
<td>1.1941</td>
<td>30.603</td>
<td>215</td>
<td>0.2524</td>
<td>75</td>
<td>0.723</td>
<td>-676.4</td>
</tr>
<tr>
<td>a300</td>
<td>1.2422</td>
<td>33.155</td>
<td>180</td>
<td>0.2369</td>
<td>60</td>
<td>0.707</td>
<td>-730.3</td>
</tr>
</tbody>
</table>

aProperties at this temperature reflect the effect of the condensation of water from the combustion products.


TABLE VI. - THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 40 ATMOSPHERES

(a) Fuel-air ratio, 0.01

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2220</td>
<td>28.859</td>
<td>826 × 10^{-6}</td>
<td>0.4028</td>
<td>509 × 10^{-6}</td>
<td>0.654</td>
<td>657.7</td>
</tr>
<tr>
<td>2700</td>
<td>1.2285</td>
<td>28.891</td>
<td>805</td>
<td>0.3867</td>
<td>468</td>
<td>0.665</td>
<td>618.2</td>
</tr>
<tr>
<td>2600</td>
<td>1.2350</td>
<td>28.915</td>
<td>784</td>
<td>0.3729</td>
<td>433</td>
<td>0.674</td>
<td>580.3</td>
</tr>
<tr>
<td>2500</td>
<td>1.2413</td>
<td>28.932</td>
<td>762</td>
<td>0.3611</td>
<td>404</td>
<td>0.682</td>
<td>543.6</td>
</tr>
<tr>
<td>2400</td>
<td>1.2475</td>
<td>28.944</td>
<td>741</td>
<td>0.3512</td>
<td>379</td>
<td>0.687</td>
<td>508.0</td>
</tr>
<tr>
<td>2300</td>
<td>1.2535</td>
<td>28.952</td>
<td>719</td>
<td>0.3427</td>
<td>357</td>
<td>0.691</td>
<td>473.3</td>
</tr>
<tr>
<td>2200</td>
<td>1.2592</td>
<td>28.957</td>
<td>698</td>
<td>0.3354</td>
<td>337</td>
<td>0.694</td>
<td>439.4</td>
</tr>
<tr>
<td>2100</td>
<td>1.2648</td>
<td>28.961</td>
<td>676</td>
<td>0.3289</td>
<td>319</td>
<td>0.697</td>
<td>405.2</td>
</tr>
<tr>
<td>2000</td>
<td>1.2703</td>
<td>28.963</td>
<td>654</td>
<td>0.3231</td>
<td>303</td>
<td>0.698</td>
<td>373.6</td>
</tr>
<tr>
<td>1900</td>
<td>1.2757</td>
<td>28.965</td>
<td>632</td>
<td>0.3178</td>
<td>287</td>
<td>0.700</td>
<td>341.6</td>
</tr>
<tr>
<td>1800</td>
<td>1.2811</td>
<td>28.965</td>
<td>610</td>
<td>0.3128</td>
<td>272</td>
<td>0.701</td>
<td>310.0</td>
</tr>
<tr>
<td>1700</td>
<td>1.2866</td>
<td>28.966</td>
<td>588</td>
<td>0.3081</td>
<td>258</td>
<td>0.701</td>
<td>279.0</td>
</tr>
<tr>
<td>1600</td>
<td>1.2920</td>
<td>28.966</td>
<td>565</td>
<td>0.3035</td>
<td>244</td>
<td>0.702</td>
<td>248.4</td>
</tr>
<tr>
<td>1500</td>
<td>1.2976</td>
<td>28.965</td>
<td>542</td>
<td>0.2991</td>
<td>231</td>
<td>0.703</td>
<td>218.3</td>
</tr>
<tr>
<td>1400</td>
<td>1.3033</td>
<td>28.965</td>
<td>519</td>
<td>0.2948</td>
<td>217</td>
<td>0.704</td>
<td>188.6</td>
</tr>
<tr>
<td>1300</td>
<td>1.3091</td>
<td>495</td>
<td></td>
<td>0.2905</td>
<td>204</td>
<td>0.704</td>
<td>159.3</td>
</tr>
<tr>
<td>1200</td>
<td>1.3151</td>
<td>470</td>
<td></td>
<td>0.2863</td>
<td>191</td>
<td>0.705</td>
<td>130.5</td>
</tr>
<tr>
<td>1100</td>
<td>1.3216</td>
<td>445</td>
<td></td>
<td>0.2819</td>
<td>178</td>
<td>0.706</td>
<td>102.1</td>
</tr>
<tr>
<td>1000</td>
<td>1.3285</td>
<td>419</td>
<td></td>
<td>0.2775</td>
<td>164</td>
<td>0.706</td>
<td>74.1</td>
</tr>
<tr>
<td>900</td>
<td>1.3368</td>
<td>391</td>
<td></td>
<td>0.2735</td>
<td>150</td>
<td>0.707</td>
<td>46.6</td>
</tr>
<tr>
<td>800</td>
<td>1.3466</td>
<td>361</td>
<td></td>
<td>0.2665</td>
<td>136</td>
<td>0.708</td>
<td>19.6</td>
</tr>
<tr>
<td>700</td>
<td>1.3576</td>
<td>331</td>
<td></td>
<td>0.2605</td>
<td>122</td>
<td>0.708</td>
<td>-6.7</td>
</tr>
<tr>
<td>600</td>
<td>1.3690</td>
<td>298</td>
<td></td>
<td>0.2545</td>
<td>107</td>
<td>0.708</td>
<td>-32.5</td>
</tr>
<tr>
<td>500</td>
<td>1.3799</td>
<td>263</td>
<td></td>
<td>0.2492</td>
<td>92</td>
<td>0.709</td>
<td>-57.6</td>
</tr>
<tr>
<td>400</td>
<td>1.3892</td>
<td>225</td>
<td></td>
<td>0.2449</td>
<td>78</td>
<td>0.709</td>
<td>-82.3</td>
</tr>
<tr>
<td>300</td>
<td>1.3500</td>
<td>29.523</td>
<td>183</td>
<td>0.2397</td>
<td>62</td>
<td>0.706</td>
<td>-113.5</td>
</tr>
</tbody>
</table>

аProperties at this temperature reflect the effect of the condensation of water from the combustion products.
### TABLE VI. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 40 ATMOSPHERES

(b) Fuel-air ratio, 0.02

<table>
<thead>
<tr>
<th>Temperature, ( T ), (\text{K} )</th>
<th>Isentropic exponent, ( \gamma )</th>
<th>Molecular weight, ( \mu ), ( g/(\text{cm})(\text{sec}) )</th>
<th>Viscosity, ( \eta ), ( \text{cal}/(\text{g})(\text{K}) )</th>
<th>Specific heat at constant pressure, ( c_p ), ( \text{cal}/(\text{g})(\text{K}) )</th>
<th>Thermal conductivity, ( k ), ( \text{cal}/(\text{cm})(\text{sec})(\text{K}) )</th>
<th>Prandtl number, ( Pr )</th>
<th>Enthalpy, ( h ), ( \text{cal}/\text{g} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2131</td>
<td>28.827</td>
<td>831\times10^{-6}</td>
<td>0.4247</td>
<td>548\times10^{-6}</td>
<td>0.644</td>
<td>569.4</td>
</tr>
<tr>
<td>2700</td>
<td>1.2204</td>
<td>28.869</td>
<td>809</td>
<td>0.4040</td>
<td>497</td>
<td>0.657</td>
<td>528.0</td>
</tr>
<tr>
<td>2600</td>
<td>1.2276</td>
<td>28.900</td>
<td>788</td>
<td>0.3865</td>
<td>456</td>
<td>0.668</td>
<td>488.5</td>
</tr>
<tr>
<td>2500</td>
<td>1.2346</td>
<td>28.922</td>
<td>766</td>
<td>0.3721</td>
<td>421</td>
<td>0.677</td>
<td>450.5</td>
</tr>
<tr>
<td>2400</td>
<td>1.2414</td>
<td>28.938</td>
<td>745</td>
<td>0.3601</td>
<td>392</td>
<td>0.684</td>
<td>414.0</td>
</tr>
<tr>
<td>2300</td>
<td>1.2477</td>
<td>28.948</td>
<td>723</td>
<td>0.3502</td>
<td>367</td>
<td>0.689</td>
<td>378.5</td>
</tr>
<tr>
<td>2200</td>
<td>1.2537</td>
<td>28.956</td>
<td>701</td>
<td>0.3419</td>
<td>346</td>
<td>0.693</td>
<td>343.9</td>
</tr>
<tr>
<td>2100</td>
<td>1.2594</td>
<td>28.960</td>
<td>679</td>
<td>0.3348</td>
<td>327</td>
<td>0.695</td>
<td>310.0</td>
</tr>
<tr>
<td>2000</td>
<td>1.2649</td>
<td>28.963</td>
<td>657</td>
<td>0.3286</td>
<td>310</td>
<td>0.697</td>
<td>276.9</td>
</tr>
<tr>
<td>1900</td>
<td>1.2702</td>
<td>28.965</td>
<td>635</td>
<td>0.3231</td>
<td>293</td>
<td>0.699</td>
<td>244.3</td>
</tr>
<tr>
<td>1800</td>
<td>1.2754</td>
<td>28.966</td>
<td>612</td>
<td>0.3180</td>
<td>278</td>
<td>0.700</td>
<td>212.3</td>
</tr>
<tr>
<td>1700</td>
<td>1.2806</td>
<td>28.966</td>
<td>589</td>
<td>0.3132</td>
<td>263</td>
<td>0.701</td>
<td>180.7</td>
</tr>
<tr>
<td>1600</td>
<td>1.2859</td>
<td>28.967</td>
<td>566</td>
<td>0.3086</td>
<td>249</td>
<td>0.702</td>
<td>149.6</td>
</tr>
<tr>
<td>1500</td>
<td>1.2913</td>
<td>28.967</td>
<td>543</td>
<td>0.3041</td>
<td>235</td>
<td>0.703</td>
<td>119.0</td>
</tr>
<tr>
<td>1400</td>
<td>1.2968</td>
<td>28.966</td>
<td>519</td>
<td>0.2998</td>
<td>221</td>
<td>0.704</td>
<td>88.8</td>
</tr>
<tr>
<td>1300</td>
<td>1.3024</td>
<td>28.959</td>
<td>495</td>
<td>0.2954</td>
<td>208</td>
<td>0.705</td>
<td>59.0</td>
</tr>
<tr>
<td>1200</td>
<td>1.3084</td>
<td>28.947</td>
<td>470</td>
<td>0.2910</td>
<td>194</td>
<td>0.706</td>
<td>29.7</td>
</tr>
<tr>
<td>1100</td>
<td>1.3148</td>
<td>28.928</td>
<td>445</td>
<td>0.2865</td>
<td>180</td>
<td>0.706</td>
<td>8.8</td>
</tr>
<tr>
<td>1000</td>
<td>1.3217</td>
<td>28.893</td>
<td>418</td>
<td>0.2818</td>
<td>167</td>
<td>0.707</td>
<td>-27.6</td>
</tr>
<tr>
<td>900</td>
<td>1.3301</td>
<td>28.844</td>
<td>390</td>
<td>0.2764</td>
<td>152</td>
<td>0.708</td>
<td>-55.5</td>
</tr>
<tr>
<td>800</td>
<td>1.3399</td>
<td>28.786</td>
<td>360</td>
<td>0.2704</td>
<td>137</td>
<td>0.709</td>
<td>-82.8</td>
</tr>
<tr>
<td>700</td>
<td>1.3509</td>
<td>28.713</td>
<td>329</td>
<td>0.2641</td>
<td>122</td>
<td>0.710</td>
<td>-109.6</td>
</tr>
<tr>
<td>600</td>
<td>1.3625</td>
<td>28.630</td>
<td>296</td>
<td>0.2579</td>
<td>108</td>
<td>0.711</td>
<td>-135.7</td>
</tr>
<tr>
<td>500</td>
<td>1.3737</td>
<td>28.536</td>
<td>261</td>
<td>0.2522</td>
<td>93</td>
<td>0.712</td>
<td>-161.2</td>
</tr>
<tr>
<td>400</td>
<td>1.3836</td>
<td>28.429</td>
<td>222</td>
<td>0.2474</td>
<td>77</td>
<td>0.713</td>
<td>-186.1</td>
</tr>
<tr>
<td>300</td>
<td>1.3270</td>
<td>30.118</td>
<td>183</td>
<td>0.2392</td>
<td>62</td>
<td>0.706</td>
<td>-224.6</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*

28
TABLE VI. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 40 ATMOSPHERES

(c) Fuel-air ratio, 0.03

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μg/(cm)(sec)</th>
<th>Specific heat at constant pressure, (c_p), cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2054</td>
<td>28.796</td>
<td>834×10⁻⁶</td>
<td>0.4466</td>
<td>586×10⁻⁶</td>
<td>0.636</td>
<td>482.4</td>
</tr>
<tr>
<td>2700</td>
<td>1.2132</td>
<td>28.848</td>
<td>813</td>
<td>0.4211</td>
<td>526</td>
<td>0.651</td>
<td>439.0</td>
</tr>
<tr>
<td>2600</td>
<td>1.2211</td>
<td>28.886</td>
<td>791</td>
<td>0.3998</td>
<td>477</td>
<td>0.664</td>
<td>398.0</td>
</tr>
<tr>
<td>2500</td>
<td>1.2288</td>
<td>28.913</td>
<td>770</td>
<td>0.3823</td>
<td>437</td>
<td>0.674</td>
<td>358.9</td>
</tr>
<tr>
<td>2400</td>
<td>1.2360</td>
<td>28.933</td>
<td>748</td>
<td>0.3682</td>
<td>404</td>
<td>0.681</td>
<td>321.4</td>
</tr>
<tr>
<td>2300</td>
<td>1.2427</td>
<td>28.946</td>
<td>728</td>
<td>0.3609</td>
<td>377</td>
<td>0.687</td>
<td>285.2</td>
</tr>
<tr>
<td>2200</td>
<td>1.2489</td>
<td>28.954</td>
<td>704</td>
<td>0.3477</td>
<td>354</td>
<td>0.691</td>
<td>250.0</td>
</tr>
<tr>
<td>2100</td>
<td>1.2547</td>
<td>28.960</td>
<td>682</td>
<td>0.3400</td>
<td>334</td>
<td>0.694</td>
<td>215.6</td>
</tr>
<tr>
<td>2000</td>
<td>1.2600</td>
<td>28.963</td>
<td>659</td>
<td>0.3336</td>
<td>316</td>
<td>0.696</td>
<td>181.9</td>
</tr>
<tr>
<td>1900</td>
<td>1.2652</td>
<td>28.965</td>
<td>637</td>
<td>0.3279</td>
<td>299</td>
<td>0.698</td>
<td>148.9</td>
</tr>
<tr>
<td>1800</td>
<td>1.2702</td>
<td>28.967</td>
<td>614</td>
<td>0.3228</td>
<td>283</td>
<td>0.700</td>
<td>116.3</td>
</tr>
<tr>
<td>1700</td>
<td>1.2752</td>
<td>28.967</td>
<td>591</td>
<td>0.3180</td>
<td>268</td>
<td>0.701</td>
<td>84.3</td>
</tr>
<tr>
<td>1600</td>
<td>1.2802</td>
<td>28.968</td>
<td>567</td>
<td>0.3134</td>
<td>253</td>
<td>0.702</td>
<td>52.7</td>
</tr>
<tr>
<td>1500</td>
<td>1.2854</td>
<td>28.968</td>
<td>544</td>
<td>0.3090</td>
<td>239</td>
<td>0.703</td>
<td>21.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2907</td>
<td>520</td>
<td>3046</td>
<td>225</td>
<td>0.704</td>
<td>-9.1</td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td>1.2962</td>
<td>495</td>
<td>3002</td>
<td>211</td>
<td>0.705</td>
<td>-39.3</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>1.3021</td>
<td>470</td>
<td>2956</td>
<td>197</td>
<td>0.706</td>
<td>-69.1</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>1.3085</td>
<td>444</td>
<td>2910</td>
<td>183</td>
<td>0.707</td>
<td>-98.4</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1.3154</td>
<td>417</td>
<td>2861</td>
<td>169</td>
<td>0.709</td>
<td>-127.3</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td>1.3228</td>
<td>389</td>
<td>2805</td>
<td>154</td>
<td>0.710</td>
<td>-155.6</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>1.3336</td>
<td>359</td>
<td>2742</td>
<td>139</td>
<td>0.711</td>
<td>-183.4</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1.3446</td>
<td>328</td>
<td>2676</td>
<td>123</td>
<td>0.712</td>
<td>-210.4</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.3563</td>
<td>295</td>
<td>2611</td>
<td>108</td>
<td>0.713</td>
<td>-236.9</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.3678</td>
<td>259</td>
<td>2551</td>
<td>92</td>
<td>0.715</td>
<td>-262.7</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>1.3783</td>
<td>220</td>
<td>2499</td>
<td>77</td>
<td>0.717</td>
<td>-287.9</td>
<td></td>
</tr>
<tr>
<td><strong>300</strong></td>
<td><strong>1.3064</strong></td>
<td><strong>30.726</strong></td>
<td><strong>182</strong></td>
<td><strong>2387</strong></td>
<td><strong>62</strong></td>
<td><strong>0.706</strong></td>
<td><strong>-333.5</strong></td>
</tr>
</tbody>
</table>

²Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE VI. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 40 ATMOSPHERES

(d) Fuel-air ratio, 0.04

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1978</td>
<td>28.760</td>
<td>838x10^{-6}</td>
<td>0.4714</td>
<td>627x10^{-6}</td>
<td>0.629</td>
<td>397.5</td>
</tr>
<tr>
<td>2700</td>
<td>1.2062</td>
<td>28.824</td>
<td>816</td>
<td>.4403</td>
<td>557</td>
<td>.645</td>
<td>352.0</td>
</tr>
<tr>
<td>2600</td>
<td>1.2148</td>
<td>28.871</td>
<td>794</td>
<td>.4142</td>
<td>500</td>
<td>.659</td>
<td>309.3</td>
</tr>
<tr>
<td>2500</td>
<td>1.2233</td>
<td>28.904</td>
<td>773</td>
<td>.3931</td>
<td>453</td>
<td>.670</td>
<td>269.0</td>
</tr>
<tr>
<td>2400</td>
<td>1.2311</td>
<td>28.927</td>
<td>751</td>
<td>.3764</td>
<td>416</td>
<td>.679</td>
<td>230.5</td>
</tr>
<tr>
<td>2300</td>
<td>1.2383</td>
<td>28.943</td>
<td>728</td>
<td>.3634</td>
<td>386</td>
<td>.685</td>
<td>193.6</td>
</tr>
<tr>
<td>2200</td>
<td>1.2447</td>
<td>28.953</td>
<td>706</td>
<td>.3531</td>
<td>361</td>
<td>.690</td>
<td>157.7</td>
</tr>
<tr>
<td>2100</td>
<td>1.2505</td>
<td>28.960</td>
<td>684</td>
<td>.3449</td>
<td>340</td>
<td>.693</td>
<td>122.9</td>
</tr>
<tr>
<td>2000</td>
<td>1.2558</td>
<td>28.964</td>
<td>661</td>
<td>.3382</td>
<td>321</td>
<td>.696</td>
<td>88.7</td>
</tr>
<tr>
<td>1900</td>
<td>1.2607</td>
<td>28.966</td>
<td>638</td>
<td>.3324</td>
<td>304</td>
<td>.698</td>
<td>55.2</td>
</tr>
<tr>
<td>1800</td>
<td>1.2655</td>
<td>28.967</td>
<td>615</td>
<td>.3273</td>
<td>288</td>
<td>.699</td>
<td>22.2</td>
</tr>
<tr>
<td>1700</td>
<td>1.2703</td>
<td>28.968</td>
<td>592</td>
<td>.3226</td>
<td>272</td>
<td>.701</td>
<td>-10.3</td>
</tr>
<tr>
<td>1600</td>
<td>1.2750</td>
<td>28.969</td>
<td>568</td>
<td>.3181</td>
<td>257</td>
<td>.702</td>
<td>-42.3</td>
</tr>
<tr>
<td>1500</td>
<td>1.2799</td>
<td>28.966</td>
<td>544</td>
<td>.3137</td>
<td>243</td>
<td>.703</td>
<td>-73.9</td>
</tr>
<tr>
<td>1400</td>
<td>1.2850</td>
<td>28.966</td>
<td>520</td>
<td>.3093</td>
<td>228</td>
<td>.704</td>
<td>-105.0</td>
</tr>
<tr>
<td>1300</td>
<td>1.2904</td>
<td>28.967</td>
<td>495</td>
<td>.3048</td>
<td>214</td>
<td>.705</td>
<td>-135.8</td>
</tr>
<tr>
<td>1200</td>
<td>1.2962</td>
<td>28.968</td>
<td>470</td>
<td>.3002</td>
<td>199</td>
<td>.707</td>
<td>-166.0</td>
</tr>
<tr>
<td>1100</td>
<td>1.3025</td>
<td>28.969</td>
<td>444</td>
<td>.2954</td>
<td>185</td>
<td>.708</td>
<td>-195.8</td>
</tr>
<tr>
<td>1000</td>
<td>1.3095</td>
<td>28.964</td>
<td>416</td>
<td>.2903</td>
<td>170</td>
<td>.710</td>
<td>-225.1</td>
</tr>
<tr>
<td>900</td>
<td>1.3179</td>
<td>28.966</td>
<td>388</td>
<td>.2844</td>
<td>155</td>
<td>.711</td>
<td>-253.8</td>
</tr>
<tr>
<td>800</td>
<td>1.3277</td>
<td>28.967</td>
<td>358</td>
<td>.2779</td>
<td>140</td>
<td>.713</td>
<td>-281.9</td>
</tr>
<tr>
<td>700</td>
<td>1.3387</td>
<td>28.968</td>
<td>326</td>
<td>.2711</td>
<td>124</td>
<td>.714</td>
<td>-309.4</td>
</tr>
<tr>
<td>600</td>
<td>1.3504</td>
<td>28.969</td>
<td>293</td>
<td>.2644</td>
<td>108</td>
<td>.716</td>
<td>-336.2</td>
</tr>
<tr>
<td>500</td>
<td>1.3622</td>
<td>28.969</td>
<td>257</td>
<td>.2580</td>
<td>92</td>
<td>.718</td>
<td>-362.3</td>
</tr>
<tr>
<td>400</td>
<td>1.2141</td>
<td>28.967</td>
<td>219</td>
<td>.2500</td>
<td>76</td>
<td>.718</td>
<td>-394.1</td>
</tr>
<tr>
<td>300</td>
<td>1.2880</td>
<td>31.346</td>
<td>182</td>
<td>.2382</td>
<td>61</td>
<td>.706</td>
<td>-440.3</td>
</tr>
</tbody>
</table>

aProperties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE VI. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 40 ATMOSPHERES

(e) Fuel-air ratio, 0.05

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1897</td>
<td>28.710</td>
<td>840×10^{-6}</td>
<td>0.5029</td>
<td>679×10^{-6}</td>
<td>0.623</td>
<td>316.0</td>
</tr>
<tr>
<td>2700</td>
<td>1.1984</td>
<td>28.790</td>
<td>819</td>
<td>.4651</td>
<td>596</td>
<td>.639</td>
<td>267.6</td>
</tr>
<tr>
<td>2600</td>
<td>1.2078</td>
<td>28.849</td>
<td>797</td>
<td>.4328</td>
<td>528</td>
<td>.653</td>
<td>222.8</td>
</tr>
<tr>
<td>2500</td>
<td>1.2172</td>
<td>28.891</td>
<td>775</td>
<td>.4065</td>
<td>473</td>
<td>.666</td>
<td>180.9</td>
</tr>
<tr>
<td>2400</td>
<td>1.2260</td>
<td>28.920</td>
<td>753</td>
<td>.3860</td>
<td>430</td>
<td>.675</td>
<td>141.3</td>
</tr>
<tr>
<td>2300</td>
<td>1.2339</td>
<td>28.940</td>
<td>730</td>
<td>.3703</td>
<td>396</td>
<td>.683</td>
<td>103.5</td>
</tr>
<tr>
<td>2200</td>
<td>1.2408</td>
<td>28.952</td>
<td>708</td>
<td>.3585</td>
<td>369</td>
<td>.688</td>
<td>67.1</td>
</tr>
<tr>
<td>2100</td>
<td>1.2467</td>
<td>28.959</td>
<td>685</td>
<td>.3495</td>
<td>346</td>
<td>.692</td>
<td>31.7</td>
</tr>
<tr>
<td>2000</td>
<td>1.2520</td>
<td>28.964</td>
<td>662</td>
<td>.3424</td>
<td>326</td>
<td>.695</td>
<td>-2.9</td>
</tr>
<tr>
<td>1900</td>
<td>1.2568</td>
<td>28.967</td>
<td>639</td>
<td>.3365</td>
<td>309</td>
<td>.697</td>
<td>-36.8</td>
</tr>
<tr>
<td>1800</td>
<td>1.2613</td>
<td>28.968</td>
<td>616</td>
<td>.3315</td>
<td>292</td>
<td>.699</td>
<td>-70.2</td>
</tr>
<tr>
<td>1700</td>
<td>1.2658</td>
<td>28.969</td>
<td>592</td>
<td>.3269</td>
<td>276</td>
<td>.700</td>
<td>-103.1</td>
</tr>
<tr>
<td>1600</td>
<td>1.2703</td>
<td>28.969</td>
<td>568</td>
<td>.3225</td>
<td>261</td>
<td>.702</td>
<td>-135.6</td>
</tr>
<tr>
<td>1500</td>
<td>1.2749</td>
<td>28.970</td>
<td>544</td>
<td>.3182</td>
<td>246</td>
<td>.703</td>
<td>-167.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2798</td>
<td>28.970</td>
<td>519</td>
<td>.3138</td>
<td>231</td>
<td>.705</td>
<td>-199.2</td>
</tr>
<tr>
<td>1300</td>
<td>1.2850</td>
<td>494</td>
<td>.3093</td>
<td>217</td>
<td>.706</td>
<td>-230.4</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>1.2906</td>
<td>469</td>
<td>.3046</td>
<td>202</td>
<td>.707</td>
<td>-261.1</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>1.2969</td>
<td>442</td>
<td>.2996</td>
<td>187</td>
<td>.709</td>
<td>-291.3</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1.3038</td>
<td>415</td>
<td>.2943</td>
<td>172</td>
<td>.711</td>
<td>-321.0</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td>1.3122</td>
<td>386</td>
<td>.2883</td>
<td>156</td>
<td>.712</td>
<td>-350.1</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>1.3221</td>
<td>356</td>
<td>.2816</td>
<td>140</td>
<td>.714</td>
<td>-378.6</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1.3331</td>
<td>324</td>
<td>.2745</td>
<td>124</td>
<td>.716</td>
<td>-406.4</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.3449</td>
<td>291</td>
<td>.2675</td>
<td>108</td>
<td>.718</td>
<td>-433.5</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.3568</td>
<td>255</td>
<td>.2608</td>
<td>92</td>
<td>.721</td>
<td>-459.9</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>1.2083</td>
<td>30.134</td>
<td>219</td>
<td>.2499</td>
<td>76</td>
<td>.718</td>
<td>-498.4</td>
</tr>
<tr>
<td>300</td>
<td>1.2712</td>
<td>31.979</td>
<td>181</td>
<td>.2377</td>
<td>61</td>
<td>.706</td>
<td>-545.1</td>
</tr>
</tbody>
</table>

Notes:
- Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE VI. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 40 ATMOSPHERES

(f) Fuel-air ratio, 0.06

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, ( \gamma )</th>
<th>Molecular weight, ( m )</th>
<th>Viscosity, ( \mu ), g/(cm)(sec)</th>
<th>Specific heat at constant pressure, ( c_p ), cal/(g)(K)</th>
<th>Thermal conductivity, ( k ), cal/(cm)(sec)(K)</th>
<th>Prandtl number, ( Pr )</th>
<th>Enthalpy, ( h ), cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1803</td>
<td>28.623</td>
<td>842\times10^{-6}</td>
<td>0.5470</td>
<td>746\times10^{-6}</td>
<td>0.617</td>
<td>241.5</td>
</tr>
<tr>
<td>2700</td>
<td>1.1884</td>
<td>28.727</td>
<td>821</td>
<td>0.5036</td>
<td>653</td>
<td>0.633</td>
<td>186.9</td>
</tr>
<tr>
<td>2600</td>
<td>1.1980</td>
<td>28.807</td>
<td>799</td>
<td>0.4640</td>
<td>573</td>
<td>0.647</td>
<td>140.6</td>
</tr>
<tr>
<td>2500</td>
<td>1.2083</td>
<td>28.865</td>
<td>777</td>
<td>0.4297</td>
<td>506</td>
<td>0.659</td>
<td>96.0</td>
</tr>
<tr>
<td>2400</td>
<td>1.2187</td>
<td>28.905</td>
<td>754</td>
<td>0.4021</td>
<td>453</td>
<td>0.670</td>
<td>54.4</td>
</tr>
<tr>
<td>2300</td>
<td>1.2282</td>
<td>28.932</td>
<td>732</td>
<td>0.3810</td>
<td>411</td>
<td>0.679</td>
<td>15.3</td>
</tr>
<tr>
<td>2200</td>
<td>1.2364</td>
<td>28.948</td>
<td>709</td>
<td>0.3655</td>
<td>378</td>
<td>0.686</td>
<td>-22.0</td>
</tr>
<tr>
<td>2100</td>
<td>1.2431</td>
<td>28.958</td>
<td>686</td>
<td>0.3544</td>
<td>352</td>
<td>0.691</td>
<td>-57.9</td>
</tr>
<tr>
<td>2000</td>
<td>1.2487</td>
<td>28.964</td>
<td>663</td>
<td>0.3463</td>
<td>331</td>
<td>0.694</td>
<td>-92.9</td>
</tr>
<tr>
<td>1900</td>
<td>1.2535</td>
<td>28.967</td>
<td>640</td>
<td>0.3402</td>
<td>312</td>
<td>0.697</td>
<td>-127.2</td>
</tr>
<tr>
<td>1800</td>
<td>1.2578</td>
<td>28.969</td>
<td>616</td>
<td>0.3352</td>
<td>296</td>
<td>0.699</td>
<td>-161.0</td>
</tr>
<tr>
<td>1700</td>
<td>1.2619</td>
<td>28.970</td>
<td>592</td>
<td>0.3307</td>
<td>280</td>
<td>0.700</td>
<td>-194.3</td>
</tr>
<tr>
<td>1600</td>
<td>1.2660</td>
<td>28.970</td>
<td>568</td>
<td>0.3265</td>
<td>264</td>
<td>0.702</td>
<td>-227.2</td>
</tr>
<tr>
<td>1500</td>
<td>1.2703</td>
<td>28.971</td>
<td>544</td>
<td>0.3224</td>
<td>249</td>
<td>0.703</td>
<td>-259.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2749</td>
<td>28.971</td>
<td>519</td>
<td>0.3181</td>
<td>234</td>
<td>0.705</td>
<td>-291.6</td>
</tr>
<tr>
<td>1300</td>
<td>1.2799</td>
<td>28.971</td>
<td>494</td>
<td>0.3136</td>
<td>219</td>
<td>0.706</td>
<td>-323.2</td>
</tr>
<tr>
<td>1200</td>
<td>1.2855</td>
<td>28.971</td>
<td>468</td>
<td>0.3089</td>
<td>204</td>
<td>0.708</td>
<td>-354.3</td>
</tr>
<tr>
<td>1100</td>
<td>1.2916</td>
<td>28.970</td>
<td>441</td>
<td>0.3038</td>
<td>189</td>
<td>0.710</td>
<td>-385.0</td>
</tr>
<tr>
<td>1000</td>
<td>1.2985</td>
<td>28.969</td>
<td>414</td>
<td>0.2984</td>
<td>173</td>
<td>0.712</td>
<td>-415.1</td>
</tr>
<tr>
<td>900</td>
<td>1.3069</td>
<td>28.967</td>
<td>385</td>
<td>0.2921</td>
<td>157</td>
<td>0.714</td>
<td>-444.6</td>
</tr>
<tr>
<td>800</td>
<td>1.3167</td>
<td>28.965</td>
<td>354</td>
<td>0.2852</td>
<td>141</td>
<td>0.716</td>
<td>-473.5</td>
</tr>
<tr>
<td>700</td>
<td>1.3277</td>
<td>28.962</td>
<td>322</td>
<td>0.2799</td>
<td>125</td>
<td>0.718</td>
<td>-501.6</td>
</tr>
<tr>
<td>600</td>
<td>1.3396</td>
<td>28.958</td>
<td>288</td>
<td>0.2706</td>
<td>108</td>
<td>0.721</td>
<td>-529.1</td>
</tr>
<tr>
<td>500</td>
<td>1.3518</td>
<td>28.953</td>
<td>252</td>
<td>0.2636</td>
<td>92</td>
<td>0.724</td>
<td>-555.8</td>
</tr>
<tr>
<td>a400</td>
<td>1.2026</td>
<td>30.743</td>
<td>218</td>
<td>0.2499</td>
<td>76</td>
<td>0.719</td>
<td>-600.7</td>
</tr>
<tr>
<td>a300</td>
<td>1.2561</td>
<td>32.626</td>
<td>180</td>
<td>0.2372</td>
<td>61</td>
<td>0.706</td>
<td>-647.9</td>
</tr>
</tbody>
</table>

\[^a\text{Properties at this temperature reflect the effect of the condensation of water from the combustion products.}\]
TABLE VI. - Concluded. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF ASTM-A-1 AND AIR AT 40 ATMOSPHERES

(g) Fuel-air ratio, 0.06817 (stoichiometric)

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, m</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, $k$, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1748</td>
<td>28.460</td>
<td>$843 \times 10^{-6}$</td>
<td>0.5802</td>
<td>$787 \times 10^{-6}$</td>
<td>0.621</td>
<td>195.7</td>
</tr>
<tr>
<td>2700</td>
<td>1.1809</td>
<td>28.583</td>
<td>821</td>
<td>.5401</td>
<td>697</td>
<td>.636</td>
<td>139.7</td>
</tr>
<tr>
<td>2600</td>
<td>1.1881</td>
<td>28.684</td>
<td>799</td>
<td>.5024</td>
<td>618</td>
<td>.650</td>
<td>87.6</td>
</tr>
<tr>
<td>2500</td>
<td>1.1964</td>
<td>28.765</td>
<td>777</td>
<td>.4682</td>
<td>551</td>
<td>.661</td>
<td>39.1</td>
</tr>
<tr>
<td>2400</td>
<td>1.2054</td>
<td>28.827</td>
<td>755</td>
<td>.4380</td>
<td>494</td>
<td>.670</td>
<td>-6.2</td>
</tr>
<tr>
<td>2300</td>
<td>1.2147</td>
<td>28.875</td>
<td>732</td>
<td>.4122</td>
<td>446</td>
<td>.677</td>
<td>-48.7</td>
</tr>
<tr>
<td>2200</td>
<td>1.2238</td>
<td>28.909</td>
<td>710</td>
<td>.3909</td>
<td>406</td>
<td>.683</td>
<td>-88.8</td>
</tr>
<tr>
<td>2100</td>
<td>1.2324</td>
<td>28.933</td>
<td>687</td>
<td>.3737</td>
<td>373</td>
<td>.688</td>
<td>-127.0</td>
</tr>
<tr>
<td>2000</td>
<td>1.2402</td>
<td>28.948</td>
<td>664</td>
<td>.3602</td>
<td>346</td>
<td>.691</td>
<td>-163.7</td>
</tr>
<tr>
<td>1900</td>
<td>1.2471</td>
<td>28.959</td>
<td>640</td>
<td>.3497</td>
<td>322</td>
<td>.694</td>
<td>-199.1</td>
</tr>
<tr>
<td>1800</td>
<td>1.2530</td>
<td>28.965</td>
<td>616</td>
<td>.3416</td>
<td>302</td>
<td>.697</td>
<td>-233.7</td>
</tr>
<tr>
<td>1700</td>
<td>1.2581</td>
<td>28.968</td>
<td>592</td>
<td>.3353</td>
<td>284</td>
<td>.699</td>
<td>-267.5</td>
</tr>
<tr>
<td>1600</td>
<td>1.2627</td>
<td>28.970</td>
<td>568</td>
<td>.3301</td>
<td>267</td>
<td>.701</td>
<td>-300.8</td>
</tr>
<tr>
<td>1500</td>
<td>1.2671</td>
<td>28.971</td>
<td>543</td>
<td>.3255</td>
<td>252</td>
<td>.703</td>
<td>-333.6</td>
</tr>
<tr>
<td>1400</td>
<td>1.2716</td>
<td>28.971</td>
<td>518</td>
<td>.3212</td>
<td>236</td>
<td>.705</td>
<td>-365.9</td>
</tr>
<tr>
<td>1300</td>
<td>1.2764</td>
<td>493</td>
<td>.3168</td>
<td>221</td>
<td>.707</td>
<td>-397.8</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>1.2817</td>
<td>467</td>
<td>.3121</td>
<td>205</td>
<td>.709</td>
<td>-429.3</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>1.2877</td>
<td>440</td>
<td>.3070</td>
<td>190</td>
<td>.711</td>
<td>-460.2</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1.2945</td>
<td>412</td>
<td>.3015</td>
<td>174</td>
<td>.713</td>
<td>-490.6</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td>1.3028</td>
<td>383</td>
<td>.2951</td>
<td>158</td>
<td>.715</td>
<td>-520.5</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>1.3126</td>
<td>352</td>
<td>.2880</td>
<td>142</td>
<td>.717</td>
<td>-549.6</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1.3236</td>
<td>320</td>
<td>.2806</td>
<td>125</td>
<td>.720</td>
<td>-578.1</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.3354</td>
<td>286</td>
<td>.2731</td>
<td>108</td>
<td>.723</td>
<td>-605.8</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.3478</td>
<td>250</td>
<td>.2658</td>
<td>91</td>
<td>.726</td>
<td>-632.7</td>
<td></td>
</tr>
<tr>
<td>a400</td>
<td>1.1980</td>
<td>31.250</td>
<td>217</td>
<td>.2498</td>
<td>75</td>
<td>.720</td>
<td>-682.9</td>
</tr>
<tr>
<td>a300</td>
<td>1.2446</td>
<td>33.164</td>
<td>180</td>
<td>.2368</td>
<td>60</td>
<td>.707</td>
<td>-730.4</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, ( \gamma )</th>
<th>Molecular weight, m</th>
<th>Viscosity, ( \mu ), g/(cm)(sec)</th>
<th>Specific heat at constant pressure, ( c_p ), cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2129</td>
<td>28.600</td>
<td>827 \times 10^{-6}</td>
<td>0.4317</td>
<td>571 \times 10^{-6}</td>
<td>0.626</td>
<td>655.0</td>
</tr>
<tr>
<td>2700</td>
<td>1.2204</td>
<td>28.646</td>
<td>806</td>
<td>0.4095</td>
<td>513</td>
<td>0.643</td>
<td>612.9</td>
</tr>
<tr>
<td>2600</td>
<td>1.2280</td>
<td>28.680</td>
<td>784</td>
<td>0.3909</td>
<td>466</td>
<td>0.657</td>
<td>572.9</td>
</tr>
<tr>
<td>2500</td>
<td>1.2354</td>
<td>28.704</td>
<td>763</td>
<td>0.3751</td>
<td>428</td>
<td>0.669</td>
<td>534.7</td>
</tr>
<tr>
<td>2400</td>
<td>1.2427</td>
<td>28.722</td>
<td>741</td>
<td>0.3621</td>
<td>396</td>
<td>0.678</td>
<td>497.8</td>
</tr>
<tr>
<td>2300</td>
<td>1.2496</td>
<td>28.734</td>
<td>720</td>
<td>0.3513</td>
<td>369</td>
<td>0.685</td>
<td>462.2</td>
</tr>
<tr>
<td>2200</td>
<td>1.2561</td>
<td>28.742</td>
<td>700</td>
<td>0.3422</td>
<td>346</td>
<td>0.690</td>
<td>427.5</td>
</tr>
<tr>
<td>2100</td>
<td>1.2624</td>
<td>28.747</td>
<td>698</td>
<td>0.3345</td>
<td>326</td>
<td>0.693</td>
<td>393.7</td>
</tr>
<tr>
<td>2000</td>
<td>1.2684</td>
<td>28.751</td>
<td>694</td>
<td>0.3278</td>
<td>308</td>
<td>0.695</td>
<td>360.6</td>
</tr>
<tr>
<td>1900</td>
<td>1.2742</td>
<td>28.753</td>
<td>632</td>
<td>0.3218</td>
<td>292</td>
<td>0.697</td>
<td>328.1</td>
</tr>
<tr>
<td>1800</td>
<td>1.2799</td>
<td>28.754</td>
<td>610</td>
<td>0.3164</td>
<td>276</td>
<td>0.699</td>
<td>296.2</td>
</tr>
<tr>
<td>1700</td>
<td>1.2855</td>
<td>28.754</td>
<td>587</td>
<td>0.3113</td>
<td>261</td>
<td>0.700</td>
<td>264.8</td>
</tr>
<tr>
<td>1600</td>
<td>1.2911</td>
<td>28.755</td>
<td>565</td>
<td>0.3066</td>
<td>247</td>
<td>0.701</td>
<td>233.9</td>
</tr>
<tr>
<td>1500</td>
<td>1.2968</td>
<td>28.755</td>
<td>542</td>
<td>0.3020</td>
<td>233</td>
<td>0.702</td>
<td>203.5</td>
</tr>
<tr>
<td>1400</td>
<td>1.3025</td>
<td>28.755</td>
<td>518</td>
<td>0.2975</td>
<td>219</td>
<td>0.702</td>
<td>173.5</td>
</tr>
<tr>
<td>1300</td>
<td>1.3084</td>
<td>28.754</td>
<td>494</td>
<td>0.2932</td>
<td>206</td>
<td>0.703</td>
<td>144.0</td>
</tr>
<tr>
<td>1200</td>
<td>1.3145</td>
<td>28.749</td>
<td>469</td>
<td>0.2888</td>
<td>193</td>
<td>0.704</td>
<td>114.9</td>
</tr>
<tr>
<td>1100</td>
<td>1.3210</td>
<td>28.744</td>
<td>444</td>
<td>0.2844</td>
<td>179</td>
<td>0.705</td>
<td>86.2</td>
</tr>
<tr>
<td>1000</td>
<td>1.3280</td>
<td>28.739</td>
<td>418</td>
<td>0.2798</td>
<td>166</td>
<td>0.706</td>
<td>58.0</td>
</tr>
<tr>
<td>900</td>
<td>1.3364</td>
<td>28.733</td>
<td>390</td>
<td>0.2745</td>
<td>151</td>
<td>0.707</td>
<td>30.3</td>
</tr>
<tr>
<td>800</td>
<td>1.3463</td>
<td>28.727</td>
<td>360</td>
<td>0.2687</td>
<td>137</td>
<td>0.708</td>
<td>3.1</td>
</tr>
<tr>
<td>700</td>
<td>1.3573</td>
<td>28.716</td>
<td>329</td>
<td>0.2625</td>
<td>122</td>
<td>0.709</td>
<td>-23.4</td>
</tr>
<tr>
<td>600</td>
<td>1.3687</td>
<td>28.705</td>
<td>297</td>
<td>0.2566</td>
<td>107</td>
<td>0.709</td>
<td>-49.4</td>
</tr>
<tr>
<td>500</td>
<td>1.3796</td>
<td>28.694</td>
<td>262</td>
<td>0.2512</td>
<td>93</td>
<td>0.710</td>
<td>-74.8</td>
</tr>
<tr>
<td>400</td>
<td>1.3888</td>
<td>28.683</td>
<td>223</td>
<td>0.2469</td>
<td>78</td>
<td>0.711</td>
<td>-99.6</td>
</tr>
<tr>
<td>300</td>
<td>1.3988</td>
<td>28.672</td>
<td>183</td>
<td>0.2401</td>
<td>62</td>
<td>0.706</td>
<td>-135.8</td>
</tr>
</tbody>
</table>

\( a \) Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE VII. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 20 ATMOSPHERES

(b) Fuel-air ratio, 0.02

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p cal/(g)(K)</th>
<th>Thermal conductivity, k cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2028</td>
<td>28.353</td>
<td>832×10^{-6}</td>
<td>0.4646</td>
<td>637×10^{-6}</td>
<td>0.607</td>
<td>558.5</td>
</tr>
<tr>
<td>2700</td>
<td>1.2109</td>
<td>28.412</td>
<td>811</td>
<td>.4361</td>
<td>563</td>
<td>.628</td>
<td>513.5</td>
</tr>
<tr>
<td>2600</td>
<td>1.2192</td>
<td>28.455</td>
<td>789</td>
<td>.4122</td>
<td>504</td>
<td>.646</td>
<td>471.1</td>
</tr>
<tr>
<td>2500</td>
<td>1.2274</td>
<td>28.487</td>
<td>767</td>
<td>.3925</td>
<td>456</td>
<td>.660</td>
<td>430.9</td>
</tr>
<tr>
<td>2400</td>
<td>1.2353</td>
<td>28.509</td>
<td>746</td>
<td>.3764</td>
<td>418</td>
<td>.671</td>
<td>392.5</td>
</tr>
<tr>
<td>2300</td>
<td>1.2427</td>
<td>28.525</td>
<td>724</td>
<td>.3634</td>
<td>387</td>
<td>.679</td>
<td>355.6</td>
</tr>
<tr>
<td>2200</td>
<td>1.2496</td>
<td>28.535</td>
<td>702</td>
<td>.3528</td>
<td>361</td>
<td>.685</td>
<td>319.8</td>
</tr>
<tr>
<td>2100</td>
<td>1.2560</td>
<td>28.542</td>
<td>679</td>
<td>.3441</td>
<td>339</td>
<td>.690</td>
<td>284.9</td>
</tr>
<tr>
<td>2000</td>
<td>1.2621</td>
<td>28.546</td>
<td>657</td>
<td>.3367</td>
<td>320</td>
<td>.693</td>
<td>250.9</td>
</tr>
<tr>
<td>1900</td>
<td>1.2679</td>
<td>28.549</td>
<td>635</td>
<td>.3303</td>
<td>302</td>
<td>.695</td>
<td>217.6</td>
</tr>
<tr>
<td>1800</td>
<td>1.2734</td>
<td>28.551</td>
<td>612</td>
<td>.3246</td>
<td>285</td>
<td>.696</td>
<td>184.8</td>
</tr>
<tr>
<td>1700</td>
<td>1.2789</td>
<td>28.552</td>
<td>589</td>
<td>.3194</td>
<td>270</td>
<td>.698</td>
<td>152.6</td>
</tr>
<tr>
<td>1600</td>
<td>1.2843</td>
<td>28.556</td>
<td>566</td>
<td>.3145</td>
<td>255</td>
<td>.699</td>
<td>120.9</td>
</tr>
<tr>
<td>1500</td>
<td>1.2898</td>
<td>28.560</td>
<td>542</td>
<td>.3098</td>
<td>240</td>
<td>.700</td>
<td>93.7</td>
</tr>
<tr>
<td>1400</td>
<td>1.2954</td>
<td>28.562</td>
<td>518</td>
<td>.3052</td>
<td>226</td>
<td>.702</td>
<td>59.0</td>
</tr>
<tr>
<td>1300</td>
<td>1.3012</td>
<td>28.567</td>
<td>494</td>
<td>.3006</td>
<td>211</td>
<td>.703</td>
<td>28.7</td>
</tr>
<tr>
<td>1200</td>
<td>1.3073</td>
<td>28.570</td>
<td>469</td>
<td>.2960</td>
<td>197</td>
<td>.704</td>
<td>-1.1</td>
</tr>
<tr>
<td>1100</td>
<td>1.3139</td>
<td>28.572</td>
<td>443</td>
<td>.2913</td>
<td>183</td>
<td>.705</td>
<td>-30.5</td>
</tr>
<tr>
<td>1000</td>
<td>1.3210</td>
<td>28.574</td>
<td>416</td>
<td>.2864</td>
<td>169</td>
<td>.706</td>
<td>-59.4</td>
</tr>
<tr>
<td>900</td>
<td>1.3295</td>
<td>28.577</td>
<td>388</td>
<td>.2808</td>
<td>154</td>
<td>.708</td>
<td>-87.8</td>
</tr>
<tr>
<td>800</td>
<td>1.3394</td>
<td>28.581</td>
<td>358</td>
<td>.2746</td>
<td>139</td>
<td>.709</td>
<td>-115.5</td>
</tr>
<tr>
<td>700</td>
<td>1.3504</td>
<td>28.585</td>
<td>327</td>
<td>.2682</td>
<td>123</td>
<td>.711</td>
<td>-142.7</td>
</tr>
<tr>
<td>600</td>
<td>1.3620</td>
<td>28.587</td>
<td>294</td>
<td>.2619</td>
<td>108</td>
<td>.712</td>
<td>-169.2</td>
</tr>
<tr>
<td>500</td>
<td>1.3731</td>
<td>28.589</td>
<td>258</td>
<td>.2561</td>
<td>93</td>
<td>.714</td>
<td>-195.1</td>
</tr>
<tr>
<td>400</td>
<td>1.3828</td>
<td>28.591</td>
<td>220</td>
<td>.2514</td>
<td>77</td>
<td>.717</td>
<td>-220.4</td>
</tr>
<tr>
<td>300</td>
<td>1.3927</td>
<td>28.593</td>
<td>183</td>
<td>.2399</td>
<td>62</td>
<td>.706</td>
<td>-269.0</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
TABLE VII. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 20 ATMOSPHERES

(c) Fuel-air ratio, 0.03

<table>
<thead>
<tr>
<th>Temperature, $T$, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, m</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, $k$, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, $h$, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1942</td>
<td>28.115</td>
<td>$837 \times 10^{-6}$</td>
<td>0.4978</td>
<td>$703 \times 10^{-6}$</td>
<td>0.593</td>
<td>463.4</td>
</tr>
<tr>
<td>2700</td>
<td>1.2028</td>
<td>28.187</td>
<td>815</td>
<td>0.4626</td>
<td>613</td>
<td>0.616</td>
<td>415.4</td>
</tr>
<tr>
<td>2600</td>
<td>1.2117</td>
<td>28.240</td>
<td>793</td>
<td>0.4330</td>
<td>541</td>
<td>0.636</td>
<td>370.7</td>
</tr>
<tr>
<td>2500</td>
<td>1.2206</td>
<td>28.279</td>
<td>771</td>
<td>0.4089</td>
<td>484</td>
<td>0.652</td>
<td>328.7</td>
</tr>
<tr>
<td>2400</td>
<td>1.2291</td>
<td>28.306</td>
<td>749</td>
<td>0.3896</td>
<td>439</td>
<td>0.665</td>
<td>288.8</td>
</tr>
<tr>
<td>2300</td>
<td>1.2370</td>
<td>28.324</td>
<td>727</td>
<td>0.3744</td>
<td>403</td>
<td>0.675</td>
<td>250.6</td>
</tr>
<tr>
<td>2200</td>
<td>1.2442</td>
<td>28.336</td>
<td>705</td>
<td>0.3624</td>
<td>375</td>
<td>0.682</td>
<td>213.8</td>
</tr>
<tr>
<td>2100</td>
<td>1.2507</td>
<td>28.344</td>
<td>682</td>
<td>0.3527</td>
<td>350</td>
<td>0.687</td>
<td>178.1</td>
</tr>
<tr>
<td>2000</td>
<td>1.2568</td>
<td>28.350</td>
<td>659</td>
<td>0.3448</td>
<td>329</td>
<td>0.690</td>
<td>143.2</td>
</tr>
<tr>
<td>1900</td>
<td>1.2624</td>
<td>28.353</td>
<td>637</td>
<td>0.3382</td>
<td>311</td>
<td>0.693</td>
<td>109.0</td>
</tr>
<tr>
<td>1800</td>
<td>1.2678</td>
<td>28.354</td>
<td>613</td>
<td>0.3323</td>
<td>293</td>
<td>0.695</td>
<td>75.5</td>
</tr>
<tr>
<td>1700</td>
<td>1.2730</td>
<td>28.355</td>
<td>590</td>
<td>0.3270</td>
<td>277</td>
<td>0.697</td>
<td>42.6</td>
</tr>
<tr>
<td>1600</td>
<td>1.2782</td>
<td>28.356</td>
<td>566</td>
<td>0.3221</td>
<td>261</td>
<td>0.698</td>
<td>10.1</td>
</tr>
<tr>
<td>1500</td>
<td>1.2835</td>
<td>28.356</td>
<td>543</td>
<td>0.3173</td>
<td>246</td>
<td>0.699</td>
<td>-21.9</td>
</tr>
<tr>
<td>1400</td>
<td>1.2890</td>
<td>28.356</td>
<td>518</td>
<td>0.3126</td>
<td>231</td>
<td>0.701</td>
<td>-53.3</td>
</tr>
<tr>
<td>1300</td>
<td>1.2947</td>
<td>28.356</td>
<td>493</td>
<td>0.3079</td>
<td>216</td>
<td>0.702</td>
<td>-84.4</td>
</tr>
<tr>
<td>1200</td>
<td>1.3007</td>
<td>28.356</td>
<td>468</td>
<td>0.3031</td>
<td>202</td>
<td>0.704</td>
<td>-114.9</td>
</tr>
<tr>
<td>1100</td>
<td>1.3073</td>
<td>28.356</td>
<td>442</td>
<td>0.2981</td>
<td>187</td>
<td>0.705</td>
<td>-145.0</td>
</tr>
<tr>
<td>1000</td>
<td>1.3145</td>
<td>28.356</td>
<td>415</td>
<td>0.2929</td>
<td>172</td>
<td>0.707</td>
<td>-174.5</td>
</tr>
<tr>
<td>900</td>
<td>1.3231</td>
<td>28.356</td>
<td>386</td>
<td>0.2870</td>
<td>156</td>
<td>0.709</td>
<td>-203.5</td>
</tr>
<tr>
<td>800</td>
<td>1.3330</td>
<td>28.356</td>
<td>356</td>
<td>0.2805</td>
<td>140</td>
<td>0.711</td>
<td>-231.9</td>
</tr>
<tr>
<td>700</td>
<td>1.3441</td>
<td>28.356</td>
<td>324</td>
<td>0.2737</td>
<td>124</td>
<td>0.713</td>
<td>-259.6</td>
</tr>
<tr>
<td>600</td>
<td>1.3557</td>
<td>28.356</td>
<td>291</td>
<td>0.2671</td>
<td>109</td>
<td>0.716</td>
<td>-286.7</td>
</tr>
<tr>
<td>500</td>
<td>1.3671</td>
<td>28.356</td>
<td>255</td>
<td>0.2610</td>
<td>93</td>
<td>0.718</td>
<td>-313.1</td>
</tr>
<tr>
<td>400</td>
<td>1.3773</td>
<td>28.356</td>
<td>216</td>
<td>0.2558</td>
<td>76</td>
<td>0.722</td>
<td>-338.9</td>
</tr>
<tr>
<td>300</td>
<td>1.2639</td>
<td>31.349</td>
<td>182</td>
<td>0.2397</td>
<td>62</td>
<td>0.706</td>
<td>-399.6</td>
</tr>
</tbody>
</table>

Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE VII.  - Continued.  THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 20 ATMOSPHERES

(d) Fuel-air ratio, 0.04

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, $m$</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, $k$, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, $h$, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1860</td>
<td>27.875</td>
<td>840×10^{-6}</td>
<td>0.5360</td>
<td>777×10^{-6}</td>
<td>0.580</td>
<td>371.2</td>
</tr>
<tr>
<td>2700</td>
<td>1.1948</td>
<td>27.963</td>
<td>819</td>
<td>0.4930</td>
<td>669</td>
<td>0.604</td>
<td>319.8</td>
</tr>
<tr>
<td>2600</td>
<td>1.2044</td>
<td>28.028</td>
<td>797</td>
<td>0.4565</td>
<td>582</td>
<td>0.625</td>
<td>272.4</td>
</tr>
<tr>
<td>2500</td>
<td>1.2141</td>
<td>28.075</td>
<td>775</td>
<td>0.4268</td>
<td>513</td>
<td>0.644</td>
<td>228.3</td>
</tr>
<tr>
<td>2400</td>
<td>1.2234</td>
<td>28.108</td>
<td>752</td>
<td>0.4033</td>
<td>461</td>
<td>0.659</td>
<td>186.8</td>
</tr>
<tr>
<td>2300</td>
<td>1.2319</td>
<td>28.130</td>
<td>730</td>
<td>0.3853</td>
<td>420</td>
<td>0.670</td>
<td>147.4</td>
</tr>
<tr>
<td>2200</td>
<td>1.2395</td>
<td>28.144</td>
<td>707</td>
<td>0.3715</td>
<td>387</td>
<td>0.678</td>
<td>109.6</td>
</tr>
<tr>
<td>2100</td>
<td>1.2462</td>
<td>28.154</td>
<td>684</td>
<td>0.3608</td>
<td>361</td>
<td>0.684</td>
<td>73.0</td>
</tr>
<tr>
<td>2000</td>
<td>1.2522</td>
<td>28.159</td>
<td>661</td>
<td>0.3524</td>
<td>338</td>
<td>0.688</td>
<td>37.4</td>
</tr>
<tr>
<td>1900</td>
<td>1.2577</td>
<td>28.163</td>
<td>638</td>
<td>0.3455</td>
<td>319</td>
<td>0.691</td>
<td>2.5</td>
</tr>
<tr>
<td>1800</td>
<td>1.2628</td>
<td>28.165</td>
<td>614</td>
<td>0.3396</td>
<td>301</td>
<td>0.694</td>
<td>-31.7</td>
</tr>
<tr>
<td>1700</td>
<td>1.2678</td>
<td>28.166</td>
<td>591</td>
<td>0.3343</td>
<td>284</td>
<td>0.696</td>
<td>-65.4</td>
</tr>
<tr>
<td>1600</td>
<td>1.2728</td>
<td>28.166</td>
<td>567</td>
<td>0.3293</td>
<td>268</td>
<td>0.697</td>
<td>-98.6</td>
</tr>
<tr>
<td>1500</td>
<td>1.2778</td>
<td>28.167</td>
<td>542</td>
<td>0.3246</td>
<td>252</td>
<td>0.699</td>
<td>-131.3</td>
</tr>
<tr>
<td>1400</td>
<td>1.2830</td>
<td>28.167</td>
<td>518</td>
<td>0.3198</td>
<td>236</td>
<td>0.700</td>
<td>-163.5</td>
</tr>
<tr>
<td>1300</td>
<td>1.2886</td>
<td>28.167</td>
<td>492</td>
<td>0.3150</td>
<td>221</td>
<td>0.702</td>
<td>-195.3</td>
</tr>
<tr>
<td>1200</td>
<td>1.2946</td>
<td>28.167</td>
<td>467</td>
<td>0.3100</td>
<td>205</td>
<td>0.704</td>
<td>-226.5</td>
</tr>
<tr>
<td>1100</td>
<td>1.3012</td>
<td>28.167</td>
<td>440</td>
<td>0.3048</td>
<td>190</td>
<td>0.706</td>
<td>-257.3</td>
</tr>
<tr>
<td>1000</td>
<td>1.3085</td>
<td>28.167</td>
<td>413</td>
<td>0.2993</td>
<td>174</td>
<td>0.708</td>
<td>-287.5</td>
</tr>
<tr>
<td>900</td>
<td>1.3171</td>
<td>28.167</td>
<td>384</td>
<td>0.2931</td>
<td>158</td>
<td>0.710</td>
<td>-317.1</td>
</tr>
<tr>
<td>800</td>
<td>1.3271</td>
<td>28.167</td>
<td>353</td>
<td>0.2862</td>
<td>142</td>
<td>0.713</td>
<td>-346.1</td>
</tr>
<tr>
<td>700</td>
<td>1.3382</td>
<td>28.167</td>
<td>321</td>
<td>0.2792</td>
<td>125</td>
<td>0.716</td>
<td>-374.3</td>
</tr>
<tr>
<td>600</td>
<td>1.3499</td>
<td>28.167</td>
<td>287</td>
<td>0.2722</td>
<td>109</td>
<td>0.719</td>
<td>-401.9</td>
</tr>
<tr>
<td>500</td>
<td>1.3614</td>
<td>28.167</td>
<td>251</td>
<td>0.2657</td>
<td>92</td>
<td>0.723</td>
<td>-428.9</td>
</tr>
<tr>
<td>a400</td>
<td>1.1922</td>
<td>28.496</td>
<td>213</td>
<td>0.2587</td>
<td>76</td>
<td>0.726</td>
<td>-459.0</td>
</tr>
<tr>
<td>a300</td>
<td>1.2416</td>
<td>32.218</td>
<td>181</td>
<td>0.2394</td>
<td>61</td>
<td>0.706</td>
<td>-527.8</td>
</tr>
</tbody>
</table>

aProperties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE VII. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 20 ATMOSPHERES

(e) Fuel-air ratio, 0.05

<table>
<thead>
<tr>
<th>Temperature, $T$, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, $\mu$, g/(cm)(sec)</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, $k$, cal/(cm)(sec)(K)</th>
<th>Prandtl number, $Pr$</th>
<th>Enthalpy, $h$, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1771</td>
<td>27.614</td>
<td>$843 \times 10^{-6}$</td>
<td>0.5860</td>
<td>$869 \times 10^{-6}$</td>
<td>0.568</td>
<td>284.9</td>
</tr>
<tr>
<td>2700</td>
<td>1.1855</td>
<td>27.724</td>
<td>821</td>
<td>0.5352</td>
<td>743</td>
<td>0.591</td>
<td>228.9</td>
</tr>
<tr>
<td>2600</td>
<td>1.1954</td>
<td>27.808</td>
<td>799</td>
<td>0.4900</td>
<td>639</td>
<td>0.613</td>
<td>177.7</td>
</tr>
<tr>
<td>2500</td>
<td>1.2060</td>
<td>27.869</td>
<td>777</td>
<td>0.4519</td>
<td>555</td>
<td>0.633</td>
<td>130.7</td>
</tr>
<tr>
<td>2400</td>
<td>1.2166</td>
<td>27.911</td>
<td>755</td>
<td>0.4215</td>
<td>489</td>
<td>0.650</td>
<td>87.1</td>
</tr>
<tr>
<td>2300</td>
<td>1.2264</td>
<td>27.939</td>
<td>732</td>
<td>0.3983</td>
<td>439</td>
<td>0.664</td>
<td>46.1</td>
</tr>
<tr>
<td>2200</td>
<td>1.2349</td>
<td>27.957</td>
<td>709</td>
<td>0.3812</td>
<td>401</td>
<td>0.674</td>
<td>7.2</td>
</tr>
<tr>
<td>2100</td>
<td>1.2422</td>
<td>27.968</td>
<td>686</td>
<td>0.3687</td>
<td>371</td>
<td>0.681</td>
<td>-30.3</td>
</tr>
<tr>
<td>2000</td>
<td>1.2484</td>
<td>27.975</td>
<td>662</td>
<td>0.3594</td>
<td>347</td>
<td>0.686</td>
<td>-66.6</td>
</tr>
<tr>
<td>1900</td>
<td>1.2538</td>
<td>27.979</td>
<td>639</td>
<td>0.3522</td>
<td>326</td>
<td>0.690</td>
<td>-102.2</td>
</tr>
<tr>
<td>1800</td>
<td>1.2587</td>
<td>27.981</td>
<td>615</td>
<td>0.3462</td>
<td>307</td>
<td>0.693</td>
<td>-137.1</td>
</tr>
<tr>
<td>1700</td>
<td>1.2633</td>
<td>27.982</td>
<td>591</td>
<td>0.3410</td>
<td>290</td>
<td>0.695</td>
<td>-171.5</td>
</tr>
<tr>
<td>1600</td>
<td>1.2679</td>
<td>27.983</td>
<td>566</td>
<td>0.3362</td>
<td>273</td>
<td>0.697</td>
<td>-205.3</td>
</tr>
<tr>
<td>1500</td>
<td>1.2727</td>
<td>27.975</td>
<td>542</td>
<td>0.3315</td>
<td>257</td>
<td>0.698</td>
<td>-238.7</td>
</tr>
<tr>
<td>1400</td>
<td>1.2777</td>
<td>27.979</td>
<td>517</td>
<td>0.3268</td>
<td>241</td>
<td>0.700</td>
<td>-271.6</td>
</tr>
<tr>
<td>1300</td>
<td>1.2831</td>
<td>27.981</td>
<td>491</td>
<td>0.3219</td>
<td>225</td>
<td>0.702</td>
<td>-304.1</td>
</tr>
<tr>
<td>1200</td>
<td>1.2890</td>
<td>27.982</td>
<td>465</td>
<td>0.3167</td>
<td>209</td>
<td>0.704</td>
<td>-336.0</td>
</tr>
<tr>
<td>1100</td>
<td>1.2955</td>
<td>27.983</td>
<td>438</td>
<td>0.3113</td>
<td>193</td>
<td>0.707</td>
<td>-367.4</td>
</tr>
<tr>
<td>1000</td>
<td>1.3028</td>
<td>27.975</td>
<td>410</td>
<td>0.3055</td>
<td>177</td>
<td>0.709</td>
<td>-399.2</td>
</tr>
<tr>
<td>900</td>
<td>1.3115</td>
<td>27.979</td>
<td>381</td>
<td>0.2990</td>
<td>160</td>
<td>0.712</td>
<td>-428.5</td>
</tr>
<tr>
<td>800</td>
<td>1.3215</td>
<td>27.981</td>
<td>350</td>
<td>0.2919</td>
<td>143</td>
<td>0.715</td>
<td>-458.0</td>
</tr>
<tr>
<td>700</td>
<td>1.3326</td>
<td>27.982</td>
<td>318</td>
<td>0.2845</td>
<td>126</td>
<td>0.718</td>
<td>-486.8</td>
</tr>
<tr>
<td>600</td>
<td>1.3444</td>
<td>27.983</td>
<td>284</td>
<td>0.2772</td>
<td>109</td>
<td>0.722</td>
<td>-514.9</td>
</tr>
<tr>
<td>500</td>
<td>1.3561</td>
<td>27.975</td>
<td>248</td>
<td>0.2704</td>
<td>92</td>
<td>0.727</td>
<td>-542.3</td>
</tr>
<tr>
<td>400</td>
<td>1.3680</td>
<td>27.979</td>
<td>212</td>
<td>0.2588</td>
<td>75</td>
<td>0.727</td>
<td>-584.2</td>
</tr>
<tr>
<td>300</td>
<td>1.3721</td>
<td>33.119</td>
<td>180</td>
<td>0.2392</td>
<td>61</td>
<td>0.706</td>
<td>-653.5</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
TABLE VII. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 20 ATMOSPHERES

(f) Fuel-air ratio, 0.06

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, µ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, cp, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1695</td>
<td>27.260</td>
<td>844×10^{-6}</td>
<td>0.6406</td>
<td>946×10^{-6}</td>
<td>0.572</td>
<td>216.7</td>
</tr>
<tr>
<td>2700</td>
<td>1.1757</td>
<td>27.397</td>
<td>823</td>
<td>0.5917</td>
<td>820</td>
<td>0.594</td>
<td>155.1</td>
</tr>
<tr>
<td>2600</td>
<td>1.1831</td>
<td>27.508</td>
<td>801</td>
<td>0.5463</td>
<td>714</td>
<td>0.613</td>
<td>98.2</td>
</tr>
<tr>
<td>2500</td>
<td>1.1918</td>
<td>27.597</td>
<td>778</td>
<td>0.5050</td>
<td>625</td>
<td>0.629</td>
<td>45.7</td>
</tr>
<tr>
<td>2400</td>
<td>1.2014</td>
<td>27.666</td>
<td>756</td>
<td>0.4685</td>
<td>551</td>
<td>0.642</td>
<td>-2.9</td>
</tr>
<tr>
<td>2300</td>
<td>1.2117</td>
<td>27.717</td>
<td>733</td>
<td>0.4371</td>
<td>491</td>
<td>0.653</td>
<td>-48.2</td>
</tr>
<tr>
<td>2200</td>
<td>1.2222</td>
<td>27.752</td>
<td>710</td>
<td>0.4107</td>
<td>440</td>
<td>0.662</td>
<td>-90.5</td>
</tr>
<tr>
<td>2100</td>
<td>1.2324</td>
<td>27.776</td>
<td>687</td>
<td>0.3893</td>
<td>399</td>
<td>0.670</td>
<td>-130.5</td>
</tr>
<tr>
<td>2000</td>
<td>1.2416</td>
<td>27.791</td>
<td>663</td>
<td>0.3728</td>
<td>365</td>
<td>0.678</td>
<td>-168.5</td>
</tr>
<tr>
<td>1900</td>
<td>1.2491</td>
<td>27.799</td>
<td>639</td>
<td>0.3609</td>
<td>337</td>
<td>0.684</td>
<td>-205.2</td>
</tr>
<tr>
<td>1800</td>
<td>1.2551</td>
<td>27.802</td>
<td>615</td>
<td>0.3528</td>
<td>315</td>
<td>0.689</td>
<td>-240.9</td>
</tr>
<tr>
<td>1700</td>
<td>1.2599</td>
<td>27.804</td>
<td>591</td>
<td>0.3469</td>
<td>296</td>
<td>0.693</td>
<td>-275.8</td>
</tr>
<tr>
<td>1600</td>
<td>1.2643</td>
<td>27.805</td>
<td>566</td>
<td>0.3421</td>
<td>278</td>
<td>0.696</td>
<td>-310.3</td>
</tr>
<tr>
<td>1500</td>
<td>1.2686</td>
<td>541</td>
<td>0.3376</td>
<td>262</td>
<td>0.698</td>
<td>-344.2</td>
<td></td>
</tr>
<tr>
<td>1400</td>
<td>1.2732</td>
<td>515</td>
<td>0.3331</td>
<td>245</td>
<td>0.700</td>
<td>-377.8</td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td>1.2783</td>
<td>489</td>
<td>0.3283</td>
<td>229</td>
<td>0.702</td>
<td>-410.9</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>1.2839</td>
<td>463</td>
<td>0.3232</td>
<td>212</td>
<td>0.705</td>
<td>-443.4</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>1.2903</td>
<td>436</td>
<td>0.3176</td>
<td>196</td>
<td>0.707</td>
<td>-475.5</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1.2977</td>
<td>408</td>
<td>0.3116</td>
<td>179</td>
<td>0.710</td>
<td>-506.9</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td>1.3063</td>
<td>378</td>
<td>0.3048</td>
<td>162</td>
<td>0.713</td>
<td>-537.8</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>1.3163</td>
<td>347</td>
<td>0.2974</td>
<td>144</td>
<td>0.716</td>
<td>-567.9</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1.3274</td>
<td>315</td>
<td>0.2897</td>
<td>127</td>
<td>0.720</td>
<td>-597.2</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.3392</td>
<td>280</td>
<td>0.2821</td>
<td>109</td>
<td>0.725</td>
<td>-625.8</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.3511</td>
<td>244</td>
<td>0.2750</td>
<td>92</td>
<td>0.731</td>
<td>-653.7</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>1.3798</td>
<td>30.120</td>
<td>0.2589</td>
<td>75</td>
<td>0.728</td>
<td>-707.1</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>1.2050</td>
<td>34.053</td>
<td>0.2389</td>
<td>61</td>
<td>0.706</td>
<td>-776.8</td>
<td></td>
</tr>
</tbody>
</table>

Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE VII. - Concluded. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 20 ATMOSPHERES

(g) Fuel-air ratio, 0.06074 (stoichiometric)

| Temperature,  
| T,  
| K  
| Isentropic exponent,  
| γ  
| Molecular weight,  
| m  
| Viscosity,  
| μ,  
| g/(cm)(sec)  
| Specific heat at constant pressure,  
| c_p,  
| cal/(g)(K)  
| Thermal conductivity,  
| k,  
| cal/(cm)(sec)(K)  
| Prandtl number,  
| Pr  
| Enthalpy,  
| h,  
| cal/g  
| 2800 | 1.1694 | 27.225 | 844x10^{-6} | 0.6420 | 946x10^{-6} | 0.573 | 213.3 |
| 2700 | 1.1755 | 27.362 | 823 | 0.5932 | 819 | 0.596 | 151.5 |
| 2600 | 1.1829 | 27.474 | 801 | 0.5480 | 713 | 0.616 | 94.5 |
| 2500 | 1.1914 | 27.564 | 778 | 0.5070 | 624 | 0.633 | 41.8 |
| 2400 | 1.2008 | 27.633 | 756 | 0.4711 | 551 | 0.647 | -7.1 |
| 2300 | 1.2106 | 27.685 | 733 | 0.4404 | 491 | 0.658 | -52.6 |
| 2200 | 1.2205 | 27.723 | 710 | 0.4151 | 442 | 0.668 | -95.3 |
| 2100 | 1.2298 | 27.749 | 687 | 0.3948 | 402 | 0.675 | -135.8 |
| 2000 | 1.2384 | 27.767 | 663 | 0.3788 | 369 | 0.681 | -174.4 |
| 1900 | 1.2459 | 27.778 | 639 | 0.3665 | 342 | 0.685 | -211.7 |
| 1800 | 1.2524 | 27.785 | 615 | 0.3570 | 319 | 0.689 | -247.8 |
| 1700 | 1.2581 | 27.789 | 590 | 0.3497 | 298 | 0.692 | -283.1 |
| 1600 | 1.2632 | 27.791 | 566 | 0.3437 | 280 | 0.695 | -317.8 |
| 1500 | 1.2680 | 27.792 | 541 | 0.3385 | 262 | 0.697 | -351.9 |
| 1400 | 1.2728 | 27.793 | 515 | 0.3336 | 246 | 0.700 | -385.5 |
| 1300 | 1.2780 | 27.793 | 489 | 0.3287 | 229 | 0.702 | -418.6 |
| 1200 | 1.2837 | 27.793 | 463 | 0.3236 | 212 | 0.705 | -451.3 |
| 1100 | 1.2890 | 27.793 | 435 | 0.3180 | 196 | 0.707 | -483.3 |
| 1000 | 1.2973 | 27.793 | 407 | 0.3120 | 179 | 0.710 | -514.9 |
| 900  | 1.3059 | 27.793 | 378 | 0.3052 | 162 | 0.713 | -545.7 |
| 800  | 1.3160 | 27.793 | 347 | 0.2978 | 144 | 0.716 | -575.9 |
| 700  | 1.3271 | 27.793 | 314 | 0.2901 | 127 | 0.720 | -605.3 |
| 600  | 1.3389 | 27.793 | 280 | 0.2825 | 109 | 0.725 | -633.9 |
| 500  | 1.3508 | 27.793 | 243 | 0.2753 | 92 | 0.731 | -661.8 |
| a400 | 1.1794 | 30.182 | 211 | 0.2589 | 75 | 0.728 | -716.1 |
| a300 | 1.2038 | 34.124 | 180 | 0.2389 | 61 | 0.706 | -785.7 |

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
### TABLE VIII. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 30 ATMOSPHERES

(a) Fuel-air ratio, 0.01

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, ( \nu ), g/(cm)(sec)</th>
<th>Specific heat at constant pressure, ( c_p ), cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, ( h ), cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2170</td>
<td>28.624</td>
<td>827×10^{-6}</td>
<td>0.4190</td>
<td>544×10^{-6}</td>
<td>0.637</td>
<td>651.3</td>
</tr>
<tr>
<td>2700</td>
<td>1.2239</td>
<td>28.662</td>
<td>806</td>
<td>0.4000</td>
<td>495</td>
<td>0.652</td>
<td>610.4</td>
</tr>
<tr>
<td>2600</td>
<td>1.2309</td>
<td>28.691</td>
<td>784</td>
<td>0.3838</td>
<td>454</td>
<td>0.664</td>
<td>571.2</td>
</tr>
<tr>
<td>2500</td>
<td>1.2378</td>
<td>28.712</td>
<td>763</td>
<td>0.3702</td>
<td>419</td>
<td>0.674</td>
<td>533.5</td>
</tr>
<tr>
<td>2400</td>
<td>1.2445</td>
<td>28.726</td>
<td>741</td>
<td>0.3587</td>
<td>390</td>
<td>0.681</td>
<td>497.1</td>
</tr>
<tr>
<td>2300</td>
<td>1.2509</td>
<td>28.737</td>
<td>720</td>
<td>0.3490</td>
<td>366</td>
<td>0.687</td>
<td>461.7</td>
</tr>
<tr>
<td>2200</td>
<td>1.2571</td>
<td>28.744</td>
<td>708</td>
<td>0.3407</td>
<td>344</td>
<td>0.691</td>
<td>427.2</td>
</tr>
<tr>
<td>2100</td>
<td>1.2630</td>
<td>28.748</td>
<td>696</td>
<td>0.3336</td>
<td>325</td>
<td>0.694</td>
<td>393.5</td>
</tr>
<tr>
<td>2000</td>
<td>1.2688</td>
<td>28.751</td>
<td>654</td>
<td>0.3272</td>
<td>308</td>
<td>0.696</td>
<td>360.5</td>
</tr>
<tr>
<td>1900</td>
<td>1.2744</td>
<td>28.753</td>
<td>632</td>
<td>0.3215</td>
<td>291</td>
<td>0.697</td>
<td>328.1</td>
</tr>
<tr>
<td>1800</td>
<td>1.2800</td>
<td>28.754</td>
<td>610</td>
<td>0.3162</td>
<td>276</td>
<td>0.699</td>
<td>296.2</td>
</tr>
<tr>
<td>1700</td>
<td>1.2856</td>
<td>28.755</td>
<td>587</td>
<td>0.3112</td>
<td>261</td>
<td>0.700</td>
<td>264.8</td>
</tr>
<tr>
<td>1600</td>
<td>1.2911</td>
<td>565</td>
<td>3065</td>
<td>247</td>
<td>0.701</td>
<td>233.9</td>
<td></td>
</tr>
<tr>
<td>1500</td>
<td>1.2968</td>
<td>542</td>
<td>3020</td>
<td>233</td>
<td>0.702</td>
<td>203.5</td>
<td></td>
</tr>
<tr>
<td>1400</td>
<td>1.3025</td>
<td>518</td>
<td>2975</td>
<td>219</td>
<td>0.702</td>
<td>173.5</td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td>1.3084</td>
<td>494</td>
<td>2932</td>
<td>206</td>
<td>0.703</td>
<td>144.0</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>1.3145</td>
<td>469</td>
<td>2888</td>
<td>193</td>
<td>0.704</td>
<td>114.9</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>1.3210</td>
<td>444</td>
<td>2844</td>
<td>179</td>
<td>0.705</td>
<td>86.2</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1.3280</td>
<td>418</td>
<td>2798</td>
<td>166</td>
<td>0.706</td>
<td>58.0</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td>1.3364</td>
<td>390</td>
<td>2745</td>
<td>151</td>
<td>0.707</td>
<td>30.3</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>1.3463</td>
<td>360</td>
<td>2687</td>
<td>137</td>
<td>0.708</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1.3573</td>
<td>329</td>
<td>2625</td>
<td>122</td>
<td>0.709</td>
<td>-23.4</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.3687</td>
<td>297</td>
<td>2566</td>
<td>107</td>
<td>0.709</td>
<td>-49.4</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.3796</td>
<td>262</td>
<td>2512</td>
<td>93</td>
<td>0.710</td>
<td>-74.8</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>1.3888</td>
<td>223</td>
<td>2469</td>
<td>78</td>
<td>0.711</td>
<td>-99.6</td>
<td></td>
</tr>
<tr>
<td><strong>300</strong></td>
<td><strong>1.3299</strong></td>
<td><strong>29.715</strong></td>
<td><strong>183</strong></td>
<td><strong>2400</strong></td>
<td><strong>62</strong></td>
<td><strong>0.706</strong></td>
<td><strong>-136.0</strong></td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
<table>
<thead>
<tr>
<th>Temperature, $T$, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, $m$</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, $k$, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, $h$, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2074</td>
<td>28.383</td>
<td>$832 \times 10^{-6}$</td>
<td>0.4480</td>
<td>$61 \times 10^{-6}$</td>
<td>0.621</td>
<td>553.7</td>
</tr>
<tr>
<td>2700</td>
<td>1.2150</td>
<td>28.433</td>
<td>811</td>
<td>0.4236</td>
<td>538</td>
<td>0.638</td>
<td>510.1</td>
</tr>
<tr>
<td>2600</td>
<td>1.2227</td>
<td>28.470</td>
<td>789</td>
<td>0.4031</td>
<td>487</td>
<td>0.654</td>
<td>468.8</td>
</tr>
<tr>
<td>2500</td>
<td>1.2302</td>
<td>28.496</td>
<td>767</td>
<td>0.3860</td>
<td>445</td>
<td>0.666</td>
<td>429.4</td>
</tr>
<tr>
<td>2400</td>
<td>1.2375</td>
<td>28.515</td>
<td>746</td>
<td>0.3720</td>
<td>411</td>
<td>0.675</td>
<td>391.5</td>
</tr>
<tr>
<td>2300</td>
<td>1.2443</td>
<td>28.529</td>
<td>724</td>
<td>0.3604</td>
<td>383</td>
<td>0.682</td>
<td>354.9</td>
</tr>
<tr>
<td>2200</td>
<td>1.2507</td>
<td>28.538</td>
<td>702</td>
<td>0.3509</td>
<td>358</td>
<td>0.687</td>
<td>319.4</td>
</tr>
<tr>
<td>2100</td>
<td>1.2568</td>
<td>28.544</td>
<td>679</td>
<td>0.3429</td>
<td>337</td>
<td>0.690</td>
<td>284.7</td>
</tr>
<tr>
<td>2000</td>
<td>1.2626</td>
<td>28.547</td>
<td>657</td>
<td>0.3359</td>
<td>319</td>
<td>0.693</td>
<td>250.8</td>
</tr>
<tr>
<td>1900</td>
<td>1.2682</td>
<td>28.550</td>
<td>635</td>
<td>0.3399</td>
<td>301</td>
<td>0.695</td>
<td>217.5</td>
</tr>
<tr>
<td>1800</td>
<td>1.2736</td>
<td>28.551</td>
<td>612</td>
<td>0.3343</td>
<td>285</td>
<td>0.697</td>
<td>184.8</td>
</tr>
<tr>
<td>1700</td>
<td>1.2790</td>
<td>28.552</td>
<td>589</td>
<td>0.3192</td>
<td>269</td>
<td>0.698</td>
<td>152.6</td>
</tr>
<tr>
<td>1600</td>
<td>1.2844</td>
<td>28.555</td>
<td>566</td>
<td>0.3144</td>
<td>254</td>
<td>0.701</td>
<td>120.9</td>
</tr>
<tr>
<td>1500</td>
<td>1.2898</td>
<td>28.558</td>
<td>542</td>
<td>0.3097</td>
<td>240</td>
<td>0.700</td>
<td>98.7</td>
</tr>
<tr>
<td>1400</td>
<td>1.2954</td>
<td>28.561</td>
<td>518</td>
<td>0.3052</td>
<td>226</td>
<td>0.702</td>
<td>79.0</td>
</tr>
<tr>
<td>1300</td>
<td>1.3012</td>
<td>28.564</td>
<td>494</td>
<td>0.3006</td>
<td>211</td>
<td>0.703</td>
<td>28.7</td>
</tr>
<tr>
<td>1200</td>
<td>1.3073</td>
<td>28.567</td>
<td>469</td>
<td>0.2960</td>
<td>197</td>
<td>0.704</td>
<td>1.1</td>
</tr>
<tr>
<td>1100</td>
<td>1.3139</td>
<td>28.570</td>
<td>443</td>
<td>0.2913</td>
<td>183</td>
<td>0.705</td>
<td>-30.5</td>
</tr>
<tr>
<td>1000</td>
<td>1.3210</td>
<td>28.573</td>
<td>416</td>
<td>0.2864</td>
<td>169</td>
<td>0.706</td>
<td>-59.4</td>
</tr>
<tr>
<td>900</td>
<td>1.3295</td>
<td>28.576</td>
<td>388</td>
<td>0.2808</td>
<td>154</td>
<td>0.708</td>
<td>-87.8</td>
</tr>
<tr>
<td>800</td>
<td>1.3394</td>
<td>28.579</td>
<td>358</td>
<td>0.2746</td>
<td>139</td>
<td>0.709</td>
<td>-115.5</td>
</tr>
<tr>
<td>700</td>
<td>1.3504</td>
<td>28.582</td>
<td>327</td>
<td>0.2682</td>
<td>123</td>
<td>0.711</td>
<td>-142.7</td>
</tr>
<tr>
<td>600</td>
<td>1.3620</td>
<td>28.585</td>
<td>294</td>
<td>0.2619</td>
<td>108</td>
<td>0.712</td>
<td>-169.2</td>
</tr>
<tr>
<td>500</td>
<td>1.3731</td>
<td>28.588</td>
<td>258</td>
<td>0.2561</td>
<td>93</td>
<td>0.714</td>
<td>-195.1</td>
</tr>
<tr>
<td>400</td>
<td>1.3828</td>
<td>28.591</td>
<td>220</td>
<td>0.2514</td>
<td>77</td>
<td>0.717</td>
<td>-220.4</td>
</tr>
<tr>
<td>a300</td>
<td>1.2975</td>
<td>30.527</td>
<td>183</td>
<td>0.2398</td>
<td>62</td>
<td>0.706</td>
<td>-269.2</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
TABLE VIII. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 30 ATMOSPHERES

(c) Fuel-air ratio, 0.03

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1993</td>
<td>28.152</td>
<td>837×10^-6</td>
<td>0.4770</td>
<td>657×10^-6</td>
<td>0.607</td>
<td>457.4</td>
</tr>
<tr>
<td>2700</td>
<td>1.2074</td>
<td>28.212</td>
<td>815</td>
<td>0.4668</td>
<td>581</td>
<td>0.627</td>
<td>411.2</td>
</tr>
<tr>
<td>2600</td>
<td>1.2157</td>
<td>28.257</td>
<td>793</td>
<td>0.4214</td>
<td>519</td>
<td>0.645</td>
<td>367.9</td>
</tr>
<tr>
<td>2500</td>
<td>1.2239</td>
<td>28.290</td>
<td>771</td>
<td>0.4007</td>
<td>469</td>
<td>0.659</td>
<td>326.8</td>
</tr>
<tr>
<td>2400</td>
<td>1.2317</td>
<td>28.313</td>
<td>749</td>
<td>0.3841</td>
<td>430</td>
<td>0.670</td>
<td>287.6</td>
</tr>
<tr>
<td>2300</td>
<td>1.2389</td>
<td>28.329</td>
<td>727</td>
<td>0.3708</td>
<td>398</td>
<td>0.678</td>
<td>249.9</td>
</tr>
<tr>
<td>2200</td>
<td>1.2455</td>
<td>28.339</td>
<td>705</td>
<td>0.3600</td>
<td>371</td>
<td>0.684</td>
<td>213.3</td>
</tr>
<tr>
<td>2100</td>
<td>1.2517</td>
<td>28.346</td>
<td>682</td>
<td>0.3513</td>
<td>348</td>
<td>0.688</td>
<td>177.8</td>
</tr>
<tr>
<td>2000</td>
<td>1.2574</td>
<td>28.350</td>
<td>659</td>
<td>0.3440</td>
<td>328</td>
<td>0.691</td>
<td>143.0</td>
</tr>
<tr>
<td>1900</td>
<td>1.2628</td>
<td>28.353</td>
<td>637</td>
<td>0.3377</td>
<td>310</td>
<td>0.693</td>
<td>109.0</td>
</tr>
<tr>
<td>1800</td>
<td>1.2680</td>
<td>28.355</td>
<td>613</td>
<td>0.3320</td>
<td>293</td>
<td>0.695</td>
<td>75.5</td>
</tr>
<tr>
<td>1700</td>
<td>1.2732</td>
<td>28.356</td>
<td>590</td>
<td>0.3269</td>
<td>277</td>
<td>0.697</td>
<td>42.5</td>
</tr>
<tr>
<td>1600</td>
<td>1.2783</td>
<td>28.356</td>
<td>566</td>
<td>0.3220</td>
<td>261</td>
<td>0.698</td>
<td>10.1</td>
</tr>
<tr>
<td>1500</td>
<td>1.2835</td>
<td>28.356</td>
<td>542</td>
<td>0.3173</td>
<td>246</td>
<td>0.700</td>
<td>-21.9</td>
</tr>
<tr>
<td>1400</td>
<td>1.2890</td>
<td>28.353</td>
<td>518</td>
<td>0.3126</td>
<td>231</td>
<td>0.701</td>
<td>-53.3</td>
</tr>
<tr>
<td>1300</td>
<td>1.2947</td>
<td>28.355</td>
<td>493</td>
<td>0.3079</td>
<td>216</td>
<td>0.702</td>
<td>-84.4</td>
</tr>
<tr>
<td>1200</td>
<td>1.3007</td>
<td>28.356</td>
<td>468</td>
<td>0.3031</td>
<td>202</td>
<td>0.704</td>
<td>-114.9</td>
</tr>
<tr>
<td>1100</td>
<td>1.3073</td>
<td>28.356</td>
<td>442</td>
<td>0.2981</td>
<td>187</td>
<td>0.705</td>
<td>-145.0</td>
</tr>
<tr>
<td>1000</td>
<td>1.3145</td>
<td>28.355</td>
<td>415</td>
<td>0.2929</td>
<td>172</td>
<td>0.707</td>
<td>-174.5</td>
</tr>
<tr>
<td>900</td>
<td>1.3231</td>
<td>28.351</td>
<td>386</td>
<td>0.2870</td>
<td>156</td>
<td>0.709</td>
<td>-203.5</td>
</tr>
<tr>
<td>800</td>
<td>1.3330</td>
<td>28.350</td>
<td>356</td>
<td>0.2805</td>
<td>140</td>
<td>0.711</td>
<td>-231.9</td>
</tr>
<tr>
<td>700</td>
<td>1.3441</td>
<td>28.349</td>
<td>324</td>
<td>0.2737</td>
<td>124</td>
<td>0.713</td>
<td>-259.6</td>
</tr>
<tr>
<td>600</td>
<td>1.3557</td>
<td>28.348</td>
<td>291</td>
<td>0.2671</td>
<td>109</td>
<td>0.716</td>
<td>-286.7</td>
</tr>
<tr>
<td>500</td>
<td>1.3671</td>
<td>28.347</td>
<td>255</td>
<td>0.2610</td>
<td>93</td>
<td>0.718</td>
<td>-313.1</td>
</tr>
<tr>
<td>a400</td>
<td>1.2039</td>
<td>28.953</td>
<td>218</td>
<td>0.2532</td>
<td>77</td>
<td>0.719</td>
<td>-345.8</td>
</tr>
<tr>
<td>a300</td>
<td>1.2700</td>
<td>31.367</td>
<td>182</td>
<td>0.2396</td>
<td>62</td>
<td>0.706</td>
<td>-399.8</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1913</td>
<td>27.920</td>
<td>841×10⁻⁶</td>
<td>0.5105</td>
<td>721×10⁻⁶</td>
<td>0.595</td>
<td>363.7</td>
</tr>
<tr>
<td>2700</td>
<td>1.1999</td>
<td>27.994</td>
<td>819</td>
<td>.4733</td>
<td>629</td>
<td>.616</td>
<td>314.6</td>
</tr>
<tr>
<td>2600</td>
<td>1.2089</td>
<td>28.049</td>
<td>797</td>
<td>.4419</td>
<td>554</td>
<td>.636</td>
<td>268.8</td>
</tr>
<tr>
<td>2500</td>
<td>1.2179</td>
<td>28.089</td>
<td>775</td>
<td>.4165</td>
<td>495</td>
<td>.651</td>
<td>226.0</td>
</tr>
<tr>
<td>2400</td>
<td>1.2264</td>
<td>28.116</td>
<td>752</td>
<td>.3964</td>
<td>449</td>
<td>.664</td>
<td>185.4</td>
</tr>
<tr>
<td>2300</td>
<td>1.2341</td>
<td>28.135</td>
<td>730</td>
<td>.3808</td>
<td>413</td>
<td>.674</td>
<td>146.5</td>
</tr>
<tr>
<td>2200</td>
<td>1.2410</td>
<td>28.147</td>
<td>707</td>
<td>.3686</td>
<td>383</td>
<td>.681</td>
<td>109.1</td>
</tr>
<tr>
<td>2100</td>
<td>1.2473</td>
<td>28.155</td>
<td>684</td>
<td>.3591</td>
<td>358</td>
<td>.686</td>
<td>72.7</td>
</tr>
<tr>
<td>2000</td>
<td>1.2529</td>
<td>28.160</td>
<td>661</td>
<td>.3514</td>
<td>337</td>
<td>.689</td>
<td>37.2</td>
</tr>
<tr>
<td>1900</td>
<td>1.2581</td>
<td>28.163</td>
<td>638</td>
<td>.3449</td>
<td>318</td>
<td>.692</td>
<td>2.4</td>
</tr>
<tr>
<td>1800</td>
<td>1.2631</td>
<td>28.165</td>
<td>614</td>
<td>.3393</td>
<td>300</td>
<td>.694</td>
<td>-31.8</td>
</tr>
<tr>
<td>1700</td>
<td>1.2679</td>
<td>28.166</td>
<td>591</td>
<td>.3341</td>
<td>284</td>
<td>.696</td>
<td>-65.5</td>
</tr>
<tr>
<td>1600</td>
<td>1.2728</td>
<td>28.166</td>
<td>567</td>
<td>.3293</td>
<td>268</td>
<td>.697</td>
<td>-98.6</td>
</tr>
<tr>
<td>1500</td>
<td>1.2778</td>
<td>28.167</td>
<td>542</td>
<td>.3245</td>
<td>252</td>
<td>.699</td>
<td>-131.3</td>
</tr>
<tr>
<td>1400</td>
<td>1.2831</td>
<td>28.167</td>
<td>518</td>
<td>.3198</td>
<td>236</td>
<td>.700</td>
<td>-165.3</td>
</tr>
<tr>
<td>1300</td>
<td>1.2886</td>
<td>28.167</td>
<td>492</td>
<td>.3150</td>
<td>221</td>
<td>.702</td>
<td>-195.3</td>
</tr>
<tr>
<td>1200</td>
<td>1.2946</td>
<td>28.166</td>
<td>467</td>
<td>.3100</td>
<td>205</td>
<td>.704</td>
<td>-226.5</td>
</tr>
<tr>
<td>1100</td>
<td>1.3012</td>
<td>28.166</td>
<td>440</td>
<td>.3048</td>
<td>190</td>
<td>.706</td>
<td>-257.3</td>
</tr>
<tr>
<td>1000</td>
<td>1.3085</td>
<td>28.167</td>
<td>413</td>
<td>.2993</td>
<td>174</td>
<td>.708</td>
<td>-287.5</td>
</tr>
<tr>
<td>900</td>
<td>1.3171</td>
<td>28.167</td>
<td>384</td>
<td>.2931</td>
<td>158</td>
<td>.710</td>
<td>-317.1</td>
</tr>
<tr>
<td>800</td>
<td>1.3271</td>
<td>28.167</td>
<td>353</td>
<td>.2862</td>
<td>142</td>
<td>.713</td>
<td>-346.1</td>
</tr>
<tr>
<td>700</td>
<td>1.3382</td>
<td>28.167</td>
<td>321</td>
<td>.2792</td>
<td>125</td>
<td>.716</td>
<td>-374.3</td>
</tr>
<tr>
<td>600</td>
<td>1.3499</td>
<td>28.167</td>
<td>287</td>
<td>.2722</td>
<td>109</td>
<td>.719</td>
<td>-401.9</td>
</tr>
<tr>
<td>500</td>
<td>1.3614</td>
<td>28.167</td>
<td>251</td>
<td>.2657</td>
<td>92</td>
<td>.723</td>
<td>-428.8</td>
</tr>
<tr>
<td>a400</td>
<td>1.3961</td>
<td>29.756</td>
<td>217</td>
<td>.2533</td>
<td>76</td>
<td>.720</td>
<td>-473.1</td>
</tr>
<tr>
<td>a300</td>
<td>1.4264</td>
<td>32.237</td>
<td>181</td>
<td>.2394</td>
<td>61</td>
<td>.706</td>
<td>-528.0</td>
</tr>
</tbody>
</table>

Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE VIII. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 30 ATMOSPHERES

(e) Fuel-air ratio, 0.05

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1824</td>
<td>27.669</td>
<td>843×10^{-6}</td>
<td>0.5557</td>
<td>804×10^{-6}</td>
<td>0.583</td>
<td>275.4</td>
</tr>
<tr>
<td>2700</td>
<td>1.1909</td>
<td>27.764</td>
<td>822</td>
<td>.5106</td>
<td>694</td>
<td>.604</td>
<td>222.1</td>
</tr>
<tr>
<td>2600</td>
<td>1.2005</td>
<td>27.835</td>
<td>800</td>
<td>.4711</td>
<td>604</td>
<td>.624</td>
<td>173.1</td>
</tr>
<tr>
<td>2500</td>
<td>1.2106</td>
<td>27.887</td>
<td>777</td>
<td>.4382</td>
<td>531</td>
<td>.641</td>
<td>127.7</td>
</tr>
<tr>
<td>2400</td>
<td>1.2203</td>
<td>27.922</td>
<td>755</td>
<td>.4121</td>
<td>474</td>
<td>.656</td>
<td>85.2</td>
</tr>
<tr>
<td>2300</td>
<td>1.2291</td>
<td>27.946</td>
<td>732</td>
<td>.3923</td>
<td>430</td>
<td>.668</td>
<td>45.0</td>
</tr>
<tr>
<td>2200</td>
<td>1.2368</td>
<td>27.961</td>
<td>709</td>
<td>.3775</td>
<td>396</td>
<td>.677</td>
<td>6.6</td>
</tr>
<tr>
<td>2100</td>
<td>1.2434</td>
<td>27.970</td>
<td>686</td>
<td>.3665</td>
<td>368</td>
<td>.683</td>
<td>-30.6</td>
</tr>
<tr>
<td>2000</td>
<td>1.2491</td>
<td>27.976</td>
<td>662</td>
<td>.3582</td>
<td>345</td>
<td>.687</td>
<td>-66.8</td>
</tr>
<tr>
<td>1900</td>
<td>1.2542</td>
<td>27.979</td>
<td>639</td>
<td>.3515</td>
<td>325</td>
<td>.690</td>
<td>-102.3</td>
</tr>
<tr>
<td>1800</td>
<td>1.2589</td>
<td>27.981</td>
<td>615</td>
<td>.3459</td>
<td>307</td>
<td>.693</td>
<td>-137.2</td>
</tr>
<tr>
<td>1700</td>
<td>1.2634</td>
<td>27.982</td>
<td>591</td>
<td>.3409</td>
<td>290</td>
<td>.695</td>
<td>-171.5</td>
</tr>
<tr>
<td>1600</td>
<td>1.2680</td>
<td>27.983</td>
<td>566</td>
<td>.3361</td>
<td>273</td>
<td>.697</td>
<td>-205.3</td>
</tr>
<tr>
<td>1500</td>
<td>1.2727</td>
<td>27.976</td>
<td>542</td>
<td>.3315</td>
<td>257</td>
<td>.698</td>
<td>-238.7</td>
</tr>
<tr>
<td>1400</td>
<td>1.2777</td>
<td>27.979</td>
<td>517</td>
<td>.3267</td>
<td>241</td>
<td>.700</td>
<td>-271.6</td>
</tr>
<tr>
<td>1300</td>
<td>1.2831</td>
<td>27.981</td>
<td>491</td>
<td>.3219</td>
<td>225</td>
<td>.702</td>
<td>-304.1</td>
</tr>
<tr>
<td>1200</td>
<td>1.2890</td>
<td>27.982</td>
<td>465</td>
<td>.3167</td>
<td>209</td>
<td>.704</td>
<td>-336.0</td>
</tr>
<tr>
<td>1100</td>
<td>1.2955</td>
<td>27.983</td>
<td>438</td>
<td>.3113</td>
<td>193</td>
<td>.707</td>
<td>-367.4</td>
</tr>
<tr>
<td>1000</td>
<td>1.3028</td>
<td>27.976</td>
<td>410</td>
<td>.3055</td>
<td>177</td>
<td>.709</td>
<td>-398.2</td>
</tr>
<tr>
<td>900</td>
<td>1.3115</td>
<td>27.979</td>
<td>381</td>
<td>.2990</td>
<td>160</td>
<td>.712</td>
<td>-428.5</td>
</tr>
<tr>
<td>800</td>
<td>1.3215</td>
<td>27.981</td>
<td>350</td>
<td>.2919</td>
<td>143</td>
<td>.715</td>
<td>-458.0</td>
</tr>
<tr>
<td>700</td>
<td>1.3326</td>
<td>27.982</td>
<td>318</td>
<td>.2845</td>
<td>126</td>
<td>.718</td>
<td>-486.8</td>
</tr>
<tr>
<td>600</td>
<td>1.3444</td>
<td>27.983</td>
<td>284</td>
<td>.2772</td>
<td>109</td>
<td>.722</td>
<td>-514.9</td>
</tr>
<tr>
<td>500</td>
<td>1.3561</td>
<td>27.976</td>
<td>248</td>
<td>.2704</td>
<td>92</td>
<td>.727</td>
<td>-542.3</td>
</tr>
<tr>
<td>400</td>
<td>1.1884</td>
<td>30.588</td>
<td>216</td>
<td>.2534</td>
<td>76</td>
<td>.721</td>
<td>-598.0</td>
</tr>
<tr>
<td>300</td>
<td>1.2259</td>
<td>33.138</td>
<td>181</td>
<td>.2391</td>
<td>61</td>
<td>.706</td>
<td>-653.6</td>
</tr>
</tbody>
</table>

Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE VIII. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 30 ATMOSPHERES

(f) Fuel-air ratio, 0.06

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, $m$</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, $k$, cal/(cm)(sec)(K)</th>
<th>Prandtl number, $Pr$</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1739</td>
<td>27.327</td>
<td>845x10^{-6}</td>
<td>0.6098</td>
<td>879x10^{-6}</td>
<td>0.586</td>
<td>204.7</td>
</tr>
<tr>
<td>2700</td>
<td>1.1802</td>
<td>27.448</td>
<td>823</td>
<td>.5659</td>
<td>769</td>
<td>.605</td>
<td>146.0</td>
</tr>
<tr>
<td>2600</td>
<td>1.1877</td>
<td>27.546</td>
<td>801</td>
<td>.5251</td>
<td>736</td>
<td>.622</td>
<td>91.5</td>
</tr>
<tr>
<td>2500</td>
<td>1.1962</td>
<td>27.625</td>
<td>779</td>
<td>.4881</td>
<td>657</td>
<td>.636</td>
<td>40.8</td>
</tr>
<tr>
<td>2400</td>
<td>1.2056</td>
<td>27.685</td>
<td>756</td>
<td>.4554</td>
<td>587</td>
<td>.648</td>
<td>-6.3</td>
</tr>
<tr>
<td>2300</td>
<td>1.2154</td>
<td>27.729</td>
<td>733</td>
<td>.4273</td>
<td>547</td>
<td>.657</td>
<td>-50.4</td>
</tr>
<tr>
<td>2200</td>
<td>1.2253</td>
<td>27.760</td>
<td>710</td>
<td>.4036</td>
<td>501</td>
<td>.665</td>
<td>-91.9</td>
</tr>
<tr>
<td>2100</td>
<td>1.2348</td>
<td>27.781</td>
<td>687</td>
<td>.3845</td>
<td>464</td>
<td>.673</td>
<td>-131.3</td>
</tr>
<tr>
<td>2000</td>
<td>1.2432</td>
<td>27.793</td>
<td>663</td>
<td>.3698</td>
<td>431</td>
<td>.680</td>
<td>-169.0</td>
</tr>
<tr>
<td>1900</td>
<td>1.2501</td>
<td>27.800</td>
<td>659</td>
<td>.3594</td>
<td>398</td>
<td>.686</td>
<td>-205.4</td>
</tr>
<tr>
<td>1800</td>
<td>1.2556</td>
<td>27.803</td>
<td>615</td>
<td>.3520</td>
<td>357</td>
<td>.690</td>
<td>-240.9</td>
</tr>
<tr>
<td>1700</td>
<td>1.2602</td>
<td>27.804</td>
<td>591</td>
<td>.3466</td>
<td>314</td>
<td>.693</td>
<td>-275.9</td>
</tr>
<tr>
<td>1600</td>
<td>1.2644</td>
<td>27.805</td>
<td>566</td>
<td>.3419</td>
<td>278</td>
<td>.696</td>
<td>-310.3</td>
</tr>
<tr>
<td>1500</td>
<td>1.2686</td>
<td>27.805</td>
<td>541</td>
<td>.3376</td>
<td>235</td>
<td>.698</td>
<td>-344.2</td>
</tr>
<tr>
<td>1400</td>
<td>1.2732</td>
<td>27.805</td>
<td>515</td>
<td>.3331</td>
<td>212</td>
<td>.700</td>
<td>-377.8</td>
</tr>
<tr>
<td>1300</td>
<td>1.2783</td>
<td>28.422</td>
<td>489</td>
<td>.3283</td>
<td>229</td>
<td>.702</td>
<td>-410.9</td>
</tr>
<tr>
<td>1200</td>
<td>1.2839</td>
<td>28.463</td>
<td>463</td>
<td>.3232</td>
<td>212</td>
<td>.705</td>
<td>-443.4</td>
</tr>
<tr>
<td>1100</td>
<td>1.2893</td>
<td>28.503</td>
<td>436</td>
<td>.3176</td>
<td>196</td>
<td>.707</td>
<td>-475.5</td>
</tr>
<tr>
<td>1000</td>
<td>1.2977</td>
<td>28.584</td>
<td>408</td>
<td>.3116</td>
<td>179</td>
<td>.710</td>
<td>-506.9</td>
</tr>
<tr>
<td>900</td>
<td>1.3063</td>
<td>28.658</td>
<td>378</td>
<td>.3048</td>
<td>162</td>
<td>.713</td>
<td>-537.8</td>
</tr>
<tr>
<td>800</td>
<td>1.3163</td>
<td>30.162</td>
<td>347</td>
<td>.2974</td>
<td>144</td>
<td>.716</td>
<td>-567.9</td>
</tr>
<tr>
<td>700</td>
<td>1.3274</td>
<td>30.221</td>
<td>315</td>
<td>.2897</td>
<td>127</td>
<td>.720</td>
<td>-597.2</td>
</tr>
<tr>
<td>600</td>
<td>1.3392</td>
<td>30.280</td>
<td>280</td>
<td>.2821</td>
<td>109</td>
<td>.725</td>
<td>-625.8</td>
</tr>
<tr>
<td>500</td>
<td>1.3511</td>
<td>30.344</td>
<td>244</td>
<td>.2750</td>
<td>92</td>
<td>.731</td>
<td>-653.7</td>
</tr>
<tr>
<td>a400</td>
<td>1.1809</td>
<td>31.451</td>
<td>215</td>
<td>.2536</td>
<td>75</td>
<td>.722</td>
<td>-720.5</td>
</tr>
<tr>
<td>a300</td>
<td>1.2080</td>
<td>34.073</td>
<td>180</td>
<td>.2389</td>
<td>61</td>
<td>.706</td>
<td>-776.9</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
TABLE VIII. - Concluded. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 30 ATMOSPHERES

(g) Fuel-air ratio, 0.06074 (stoichiometric)

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, µ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, ( c_p ), cal/(g)(K)</th>
<th>Thermal conductivity, ( k ), cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1738</td>
<td>27.292</td>
<td>845 x 10^{-6}</td>
<td>0.6112</td>
<td>879 x 10^{-6}</td>
<td>0.588</td>
<td>201.3</td>
</tr>
<tr>
<td>2700</td>
<td>1.1800</td>
<td>27.413</td>
<td>823</td>
<td>0.5674</td>
<td>769</td>
<td>0.608</td>
<td>142.4</td>
</tr>
<tr>
<td>2600</td>
<td>1.1874</td>
<td>27.512</td>
<td>801</td>
<td>0.5269</td>
<td>675</td>
<td>0.625</td>
<td>87.7</td>
</tr>
<tr>
<td>2500</td>
<td>1.1958</td>
<td>27.591</td>
<td>779</td>
<td>0.4902</td>
<td>596</td>
<td>0.640</td>
<td>36.9</td>
</tr>
<tr>
<td>2400</td>
<td>1.2048</td>
<td>27.652</td>
<td>756</td>
<td>0.4582</td>
<td>531</td>
<td>0.652</td>
<td>-10.5</td>
</tr>
<tr>
<td>2300</td>
<td>1.2142</td>
<td>27.698</td>
<td>733</td>
<td>0.4309</td>
<td>477</td>
<td>0.662</td>
<td>-54.9</td>
</tr>
<tr>
<td>2200</td>
<td>1.2234</td>
<td>27.731</td>
<td>710</td>
<td>0.4083</td>
<td>433</td>
<td>0.670</td>
<td>-96.8</td>
</tr>
<tr>
<td>2100</td>
<td>1.2321</td>
<td>27.755</td>
<td>687</td>
<td>0.3901</td>
<td>396</td>
<td>0.677</td>
<td>-136.7</td>
</tr>
<tr>
<td>2000</td>
<td>1.2401</td>
<td>27.770</td>
<td>663</td>
<td>0.3757</td>
<td>365</td>
<td>0.682</td>
<td>-175.0</td>
</tr>
<tr>
<td>1900</td>
<td>1.2471</td>
<td>27.780</td>
<td>639</td>
<td>0.3646</td>
<td>340</td>
<td>0.686</td>
<td>-212.0</td>
</tr>
<tr>
<td>1800</td>
<td>1.2532</td>
<td>27.786</td>
<td>615</td>
<td>0.3559</td>
<td>317</td>
<td>0.690</td>
<td>-248.0</td>
</tr>
<tr>
<td>1700</td>
<td>1.2585</td>
<td>27.789</td>
<td>590</td>
<td>0.3491</td>
<td>298</td>
<td>0.692</td>
<td>-283.2</td>
</tr>
<tr>
<td>1600</td>
<td>1.2634</td>
<td>27.791</td>
<td>566</td>
<td>0.3434</td>
<td>280</td>
<td>0.695</td>
<td>-317.8</td>
</tr>
<tr>
<td>1500</td>
<td>1.2681</td>
<td>27.792</td>
<td>541</td>
<td>0.3384</td>
<td>262</td>
<td>0.697</td>
<td>-351.9</td>
</tr>
<tr>
<td>1400</td>
<td>1.2729</td>
<td>27.792</td>
<td>515</td>
<td>0.3336</td>
<td>246</td>
<td>0.700</td>
<td>-385.5</td>
</tr>
<tr>
<td>1300</td>
<td>1.2780</td>
<td>27.793</td>
<td>489</td>
<td>0.3287</td>
<td>229</td>
<td>0.702</td>
<td>-418.6</td>
</tr>
<tr>
<td>1200</td>
<td>1.2837</td>
<td>27.793</td>
<td>463</td>
<td>0.3236</td>
<td>212</td>
<td>0.705</td>
<td>-451.3</td>
</tr>
<tr>
<td>1100</td>
<td>1.2900</td>
<td>27.793</td>
<td>435</td>
<td>0.3180</td>
<td>196</td>
<td>0.707</td>
<td>-483.3</td>
</tr>
<tr>
<td>1000</td>
<td>1.2973</td>
<td>27.793</td>
<td>407</td>
<td>0.3120</td>
<td>179</td>
<td>0.710</td>
<td>-514.9</td>
</tr>
<tr>
<td>900</td>
<td>1.3059</td>
<td>27.793</td>
<td>378</td>
<td>0.3052</td>
<td>162</td>
<td>0.713</td>
<td>-545.7</td>
</tr>
<tr>
<td>800</td>
<td>1.3160</td>
<td>27.793</td>
<td>347</td>
<td>0.2978</td>
<td>144</td>
<td>0.716</td>
<td>-575.9</td>
</tr>
<tr>
<td>700</td>
<td>1.3271</td>
<td>27.793</td>
<td>314</td>
<td>0.2901</td>
<td>127</td>
<td>0.720</td>
<td>-605.3</td>
</tr>
<tr>
<td>600</td>
<td>1.3389</td>
<td>27.793</td>
<td>280</td>
<td>0.2825</td>
<td>109</td>
<td>0.725</td>
<td>-633.9</td>
</tr>
<tr>
<td>500</td>
<td>1.3508</td>
<td>27.793</td>
<td>243</td>
<td>0.2753</td>
<td>92</td>
<td>0.731</td>
<td>-661.8</td>
</tr>
<tr>
<td>400</td>
<td>1.1804</td>
<td>31.515</td>
<td>215</td>
<td>0.2536</td>
<td>75</td>
<td>0.722</td>
<td>-729.4</td>
</tr>
<tr>
<td>300</td>
<td>1.2067</td>
<td>34.143</td>
<td>180</td>
<td>0.2389</td>
<td>61</td>
<td>0.706</td>
<td>-785.9</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
TABLE IX. - THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 40 ATMOSPHERES

(a) Fuel-air ratio, 0.01

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, ( \mu ), g/(cm)(sec)</th>
<th>Specific heat at constant pressure, ( c_p ), cal/(g)(K)</th>
<th>Thermal conductivity, ( k ), cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2196</td>
<td>28.639</td>
<td>827×10^{-6}</td>
<td>0.4113</td>
<td>529×10^{-6}</td>
<td>0.644</td>
<td>649.0</td>
</tr>
<tr>
<td>2700</td>
<td>1.2262</td>
<td>28.672</td>
<td>806</td>
<td>0.3942</td>
<td>484</td>
<td>0.657</td>
<td>608.8</td>
</tr>
<tr>
<td>2600</td>
<td>1.2328</td>
<td>28.698</td>
<td>784</td>
<td>0.3796</td>
<td>446</td>
<td>0.668</td>
<td>570.1</td>
</tr>
<tr>
<td>2500</td>
<td>1.2393</td>
<td>28.716</td>
<td>763</td>
<td>0.3672</td>
<td>414</td>
<td>0.676</td>
<td>532.8</td>
</tr>
<tr>
<td>2400</td>
<td>1.2456</td>
<td>28.730</td>
<td>741</td>
<td>0.3566</td>
<td>387</td>
<td>0.683</td>
<td>496.6</td>
</tr>
<tr>
<td>2300</td>
<td>1.2517</td>
<td>28.739</td>
<td>720</td>
<td>0.3476</td>
<td>364</td>
<td>0.688</td>
<td>461.4</td>
</tr>
<tr>
<td>2200</td>
<td>1.2577</td>
<td>28.745</td>
<td>698</td>
<td>0.3398</td>
<td>343</td>
<td>0.692</td>
<td>427.0</td>
</tr>
<tr>
<td>2100</td>
<td>1.2634</td>
<td>28.749</td>
<td>676</td>
<td>0.3330</td>
<td>324</td>
<td>0.694</td>
<td>393.4</td>
</tr>
<tr>
<td>2000</td>
<td>1.2690</td>
<td>28.752</td>
<td>654</td>
<td>0.3268</td>
<td>307</td>
<td>0.696</td>
<td>360.4</td>
</tr>
<tr>
<td>1900</td>
<td>1.2746</td>
<td>28.753</td>
<td>632</td>
<td>0.3213</td>
<td>291</td>
<td>0.698</td>
<td>328.0</td>
</tr>
<tr>
<td>1800</td>
<td>1.2801</td>
<td>28.754</td>
<td>610</td>
<td>0.3161</td>
<td>276</td>
<td>0.699</td>
<td>296.2</td>
</tr>
<tr>
<td>1700</td>
<td>1.2856</td>
<td>28.755</td>
<td>587</td>
<td>0.3112</td>
<td>261</td>
<td>0.700</td>
<td>264.8</td>
</tr>
<tr>
<td>1600</td>
<td>1.2912</td>
<td>28.755</td>
<td>565</td>
<td>0.3065</td>
<td>247</td>
<td>0.701</td>
<td>233.9</td>
</tr>
<tr>
<td>1500</td>
<td>1.2968</td>
<td>28.755</td>
<td>542</td>
<td>0.3020</td>
<td>233</td>
<td>0.702</td>
<td>203.5</td>
</tr>
<tr>
<td>1400</td>
<td>1.3025</td>
<td>28.753</td>
<td>518</td>
<td>0.2975</td>
<td>219</td>
<td>0.702</td>
<td>173.5</td>
</tr>
<tr>
<td>1300</td>
<td>1.3084</td>
<td>28.753</td>
<td>494</td>
<td>0.2932</td>
<td>206</td>
<td>0.703</td>
<td>144.0</td>
</tr>
<tr>
<td>1200</td>
<td>1.3145</td>
<td>28.753</td>
<td>469</td>
<td>0.2888</td>
<td>193</td>
<td>0.704</td>
<td>114.9</td>
</tr>
<tr>
<td>1100</td>
<td>1.3210</td>
<td>28.749</td>
<td>444</td>
<td>0.2844</td>
<td>179</td>
<td>0.705</td>
<td>86.2</td>
</tr>
<tr>
<td>1000</td>
<td>1.3280</td>
<td>28.752</td>
<td>418</td>
<td>0.2798</td>
<td>166</td>
<td>0.706</td>
<td>58.0</td>
</tr>
<tr>
<td>900</td>
<td>1.3364</td>
<td>28.753</td>
<td>390</td>
<td>0.2745</td>
<td>151</td>
<td>0.707</td>
<td>30.3</td>
</tr>
<tr>
<td>800</td>
<td>1.3463</td>
<td>28.754</td>
<td>360</td>
<td>0.2687</td>
<td>137</td>
<td>0.708</td>
<td>3.1</td>
</tr>
<tr>
<td>700</td>
<td>1.3573</td>
<td>28.755</td>
<td>329</td>
<td>0.2625</td>
<td>122</td>
<td>0.709</td>
<td>-23.4</td>
</tr>
<tr>
<td>600</td>
<td>1.3687</td>
<td>28.749</td>
<td>297</td>
<td>0.2566</td>
<td>107</td>
<td>0.709</td>
<td>-49.4</td>
</tr>
<tr>
<td>500</td>
<td>1.3796</td>
<td>28.752</td>
<td>262</td>
<td>0.2512</td>
<td>93</td>
<td>0.710</td>
<td>-74.8</td>
</tr>
<tr>
<td>400</td>
<td>1.3888</td>
<td>28.753</td>
<td>223</td>
<td>0.2469</td>
<td>78</td>
<td>0.711</td>
<td>-99.6</td>
</tr>
<tr>
<td>300</td>
<td>1.3353</td>
<td>29.724</td>
<td>183</td>
<td>0.2400</td>
<td>62</td>
<td>0.706</td>
<td>-136.1</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
<table>
<thead>
<tr>
<th>Temperature, $T$, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, m</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, $k$, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2104</td>
<td>28.402</td>
<td>$833 \times 10^{-6}$</td>
<td>0.4378</td>
<td>$580 \times 10^{-6}$</td>
<td>0.629</td>
<td>550.7</td>
</tr>
<tr>
<td>2700</td>
<td>1.2177</td>
<td>28.446</td>
<td>811</td>
<td>0.4159</td>
<td>523</td>
<td>0.645</td>
<td>508.1</td>
</tr>
<tr>
<td>2600</td>
<td>1.2249</td>
<td>28.478</td>
<td>789</td>
<td>0.3974</td>
<td>477</td>
<td>0.658</td>
<td>467.4</td>
</tr>
<tr>
<td>2500</td>
<td>1.2320</td>
<td>28.502</td>
<td>768</td>
<td>0.3820</td>
<td>438</td>
<td>0.669</td>
<td>428.5</td>
</tr>
<tr>
<td>2400</td>
<td>1.2388</td>
<td>28.519</td>
<td>746</td>
<td>0.3692</td>
<td>407</td>
<td>0.677</td>
<td>390.9</td>
</tr>
<tr>
<td>2300</td>
<td>1.2453</td>
<td>28.531</td>
<td>724</td>
<td>0.3586</td>
<td>380</td>
<td>0.683</td>
<td>354.6</td>
</tr>
<tr>
<td>2200</td>
<td>1.2515</td>
<td>28.539</td>
<td>702</td>
<td>0.3497</td>
<td>357</td>
<td>0.688</td>
<td>319.2</td>
</tr>
<tr>
<td>2100</td>
<td>1.2573</td>
<td>28.544</td>
<td>679</td>
<td>0.3421</td>
<td>336</td>
<td>0.691</td>
<td>284.6</td>
</tr>
<tr>
<td>2000</td>
<td>1.2629</td>
<td>28.548</td>
<td>657</td>
<td>0.3355</td>
<td>318</td>
<td>0.693</td>
<td>250.7</td>
</tr>
<tr>
<td>1900</td>
<td>1.2684</td>
<td>28.550</td>
<td>635</td>
<td>0.3296</td>
<td>301</td>
<td>0.695</td>
<td>217.4</td>
</tr>
<tr>
<td>1800</td>
<td>1.2737</td>
<td>28.551</td>
<td>612</td>
<td>0.3242</td>
<td>285</td>
<td>0.697</td>
<td>184.8</td>
</tr>
<tr>
<td>1700</td>
<td>1.2791</td>
<td>28.552</td>
<td>589</td>
<td>0.3191</td>
<td>269</td>
<td>0.698</td>
<td>152.6</td>
</tr>
<tr>
<td>1600</td>
<td>1.2844</td>
<td>28.556</td>
<td>566</td>
<td>0.3144</td>
<td>254</td>
<td>0.699</td>
<td>120.9</td>
</tr>
<tr>
<td>1500</td>
<td>1.2899</td>
<td>28.562</td>
<td>542</td>
<td>0.3097</td>
<td>240</td>
<td>0.700</td>
<td>89.7</td>
</tr>
<tr>
<td>1400</td>
<td>1.2954</td>
<td>28.568</td>
<td>518</td>
<td>0.3052</td>
<td>226</td>
<td>0.702</td>
<td>59.0</td>
</tr>
<tr>
<td>1300</td>
<td>1.3012</td>
<td>28.574</td>
<td>494</td>
<td>0.3006</td>
<td>211</td>
<td>0.703</td>
<td>28.7</td>
</tr>
<tr>
<td>1200</td>
<td>1.3073</td>
<td>28.580</td>
<td>469</td>
<td>0.2960</td>
<td>197</td>
<td>0.704</td>
<td>-1.1</td>
</tr>
<tr>
<td>1100</td>
<td>1.3139</td>
<td>28.586</td>
<td>443</td>
<td>0.2913</td>
<td>183</td>
<td>0.705</td>
<td>-30.5</td>
</tr>
<tr>
<td>1000</td>
<td>1.3210</td>
<td>28.592</td>
<td>416</td>
<td>0.2864</td>
<td>169</td>
<td>0.706</td>
<td>-59.4</td>
</tr>
<tr>
<td>900</td>
<td>1.3295</td>
<td>28.600</td>
<td>388</td>
<td>0.2808</td>
<td>154</td>
<td>0.708</td>
<td>-87.8</td>
</tr>
<tr>
<td>800</td>
<td>1.3394</td>
<td>28.616</td>
<td>358</td>
<td>0.2746</td>
<td>139</td>
<td>0.709</td>
<td>-115.5</td>
</tr>
<tr>
<td>700</td>
<td>1.3504</td>
<td>28.632</td>
<td>327</td>
<td>0.2682</td>
<td>123</td>
<td>0.711</td>
<td>-142.7</td>
</tr>
<tr>
<td>600</td>
<td>1.3620</td>
<td>28.648</td>
<td>294</td>
<td>0.2619</td>
<td>108</td>
<td>0.712</td>
<td>-169.2</td>
</tr>
<tr>
<td>500</td>
<td>1.3731</td>
<td>28.664</td>
<td>258</td>
<td>0.2561</td>
<td>93</td>
<td>0.714</td>
<td>-195.1</td>
</tr>
<tr>
<td>400</td>
<td>1.2190</td>
<td>28.774</td>
<td>220</td>
<td>0.2504</td>
<td>77</td>
<td>0.716</td>
<td>-223.0</td>
</tr>
<tr>
<td>300</td>
<td>1.3017</td>
<td>30.536</td>
<td>183</td>
<td>0.2398</td>
<td>62</td>
<td>0.706</td>
<td>-269.3</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
TABLE IX. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 40 ATMOSPHERES

(c) Fuel-air ratio, 0.03

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.2026</td>
<td>28.174</td>
<td>837×10^{-6}</td>
<td>0.4642</td>
<td>630×10^{-6}</td>
<td>0.617</td>
<td>453.7</td>
</tr>
<tr>
<td>2700</td>
<td>1.2104</td>
<td>28.228</td>
<td>815</td>
<td>0.4371</td>
<td>561</td>
<td>0.635</td>
<td>408.7</td>
</tr>
<tr>
<td>2600</td>
<td>1.2183</td>
<td>28.268</td>
<td>793</td>
<td>0.4144</td>
<td>506</td>
<td>0.650</td>
<td>366.1</td>
</tr>
<tr>
<td>2500</td>
<td>1.2260</td>
<td>28.297</td>
<td>771</td>
<td>0.3958</td>
<td>461</td>
<td>0.663</td>
<td>325.6</td>
</tr>
<tr>
<td>2400</td>
<td>1.2333</td>
<td>28.317</td>
<td>749</td>
<td>0.3807</td>
<td>424</td>
<td>0.672</td>
<td>286.8</td>
</tr>
<tr>
<td>2300</td>
<td>1.2401</td>
<td>28.331</td>
<td>727</td>
<td>0.3685</td>
<td>394</td>
<td>0.680</td>
<td>249.4</td>
</tr>
<tr>
<td>2200</td>
<td>1.2464</td>
<td>28.341</td>
<td>705</td>
<td>0.3568</td>
<td>369</td>
<td>0.685</td>
<td>213.1</td>
</tr>
<tr>
<td>2100</td>
<td>1.2522</td>
<td>28.347</td>
<td>682</td>
<td>0.3504</td>
<td>347</td>
<td>0.689</td>
<td>177.6</td>
</tr>
<tr>
<td>2000</td>
<td>1.2577</td>
<td>28.351</td>
<td>659</td>
<td>0.3434</td>
<td>328</td>
<td>0.691</td>
<td>143.0</td>
</tr>
<tr>
<td>1900</td>
<td>1.2630</td>
<td>28.353</td>
<td>637</td>
<td>0.3373</td>
<td>310</td>
<td>0.694</td>
<td>108.9</td>
</tr>
<tr>
<td>1800</td>
<td>1.2681</td>
<td>28.355</td>
<td>613</td>
<td>0.3318</td>
<td>293</td>
<td>0.695</td>
<td>75.5</td>
</tr>
<tr>
<td>1700</td>
<td>1.2732</td>
<td>28.356</td>
<td>590</td>
<td>0.3268</td>
<td>277</td>
<td>0.697</td>
<td>42.5</td>
</tr>
<tr>
<td>1600</td>
<td>1.2783</td>
<td>28.356</td>
<td>566</td>
<td>0.3219</td>
<td>261</td>
<td>0.698</td>
<td>10.1</td>
</tr>
<tr>
<td>1500</td>
<td>1.2836</td>
<td>28.351</td>
<td>542</td>
<td>0.3172</td>
<td>246</td>
<td>0.700</td>
<td>-21.9</td>
</tr>
<tr>
<td>1400</td>
<td>1.2890</td>
<td>28.355</td>
<td>518</td>
<td>0.3126</td>
<td>231</td>
<td>0.701</td>
<td>-53.3</td>
</tr>
<tr>
<td>1300</td>
<td>1.2947</td>
<td>28.355</td>
<td>493</td>
<td>0.3079</td>
<td>216</td>
<td>0.702</td>
<td>-84.4</td>
</tr>
<tr>
<td>1200</td>
<td>1.3007</td>
<td>28.356</td>
<td>468</td>
<td>0.3031</td>
<td>202</td>
<td>0.704</td>
<td>-114.9</td>
</tr>
<tr>
<td>1100</td>
<td>1.3073</td>
<td>28.351</td>
<td>442</td>
<td>0.2981</td>
<td>187</td>
<td>0.705</td>
<td>-145.0</td>
</tr>
<tr>
<td>1000</td>
<td>1.3145</td>
<td>28.350</td>
<td>415</td>
<td>0.2929</td>
<td>172</td>
<td>0.707</td>
<td>-174.5</td>
</tr>
<tr>
<td>900</td>
<td>1.3231</td>
<td>28.360</td>
<td>386</td>
<td>0.2870</td>
<td>156</td>
<td>0.709</td>
<td>-203.5</td>
</tr>
<tr>
<td>800</td>
<td>1.3330</td>
<td>28.370</td>
<td>356</td>
<td>0.2805</td>
<td>140</td>
<td>0.711</td>
<td>-231.9</td>
</tr>
<tr>
<td>700</td>
<td>1.3441</td>
<td>28.380</td>
<td>324</td>
<td>0.2737</td>
<td>124</td>
<td>0.713</td>
<td>-259.6</td>
</tr>
<tr>
<td>600</td>
<td>1.3557</td>
<td>28.390</td>
<td>291</td>
<td>0.2671</td>
<td>109</td>
<td>0.716</td>
<td>-286.7</td>
</tr>
<tr>
<td>500</td>
<td>1.3671</td>
<td>28.400</td>
<td>255</td>
<td>0.2610</td>
<td>93</td>
<td>0.718</td>
<td>-313.1</td>
</tr>
<tr>
<td>400</td>
<td>1.2095</td>
<td>29.565</td>
<td>219</td>
<td>0.2505</td>
<td>77</td>
<td>0.716</td>
<td>-352.6</td>
</tr>
<tr>
<td>300</td>
<td>1.2732</td>
<td>31.376</td>
<td>182</td>
<td>0.2395</td>
<td>62</td>
<td>0.706</td>
<td>-399.9</td>
</tr>
</tbody>
</table>

Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE IX. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 40 ATMOSPHERES

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, ( \gamma )</th>
<th>Molecular weight, ( m )</th>
<th>Viscosity, ( \mu ), g/(cm)(sec)</th>
<th>Specific heat at constant pressure, ( c_p ), cal/(g)(K)</th>
<th>Thermal conductivity, ( k ), cal/(cm)(sec)(K)</th>
<th>Prandtl number, ( Pr )</th>
<th>Enthalpy, ( h ), cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1949</td>
<td>27.947</td>
<td>841\times10^{-6}</td>
<td>0.4947</td>
<td>688\times10^{-6}</td>
<td>0.605</td>
<td>359.1</td>
</tr>
<tr>
<td>2700</td>
<td>1.2033</td>
<td>28.013</td>
<td>819</td>
<td>0.4612</td>
<td>605</td>
<td>0.625</td>
<td>311.3</td>
</tr>
<tr>
<td>2600</td>
<td>1.2119</td>
<td>28.062</td>
<td>797</td>
<td>0.4330</td>
<td>538</td>
<td>0.642</td>
<td>266.7</td>
</tr>
<tr>
<td>2500</td>
<td>1.2203</td>
<td>28.097</td>
<td>775</td>
<td>0.4103</td>
<td>484</td>
<td>0.656</td>
<td>224.6</td>
</tr>
<tr>
<td>2400</td>
<td>1.2282</td>
<td>28.122</td>
<td>752</td>
<td>0.3922</td>
<td>442</td>
<td>0.667</td>
<td>184.5</td>
</tr>
<tr>
<td>2300</td>
<td>1.2355</td>
<td>28.138</td>
<td>730</td>
<td>0.3780</td>
<td>408</td>
<td>0.676</td>
<td>146.0</td>
</tr>
<tr>
<td>2200</td>
<td>1.2420</td>
<td>28.149</td>
<td>707</td>
<td>0.3669</td>
<td>380</td>
<td>0.682</td>
<td>108.8</td>
</tr>
<tr>
<td>2100</td>
<td>1.2479</td>
<td>28.156</td>
<td>684</td>
<td>0.3580</td>
<td>357</td>
<td>0.686</td>
<td>72.5</td>
</tr>
<tr>
<td>2000</td>
<td>1.2533</td>
<td>28.161</td>
<td>661</td>
<td>0.3507</td>
<td>336</td>
<td>0.690</td>
<td>37.1</td>
</tr>
<tr>
<td>1900</td>
<td>1.2584</td>
<td>28.164</td>
<td>638</td>
<td>0.3445</td>
<td>318</td>
<td>0.692</td>
<td>2.4</td>
</tr>
<tr>
<td>1800</td>
<td>1.2632</td>
<td>28.165</td>
<td>614</td>
<td>0.3391</td>
<td>300</td>
<td>0.694</td>
<td>-31.8</td>
</tr>
<tr>
<td>1700</td>
<td>1.2680</td>
<td>28.166</td>
<td>591</td>
<td>0.3340</td>
<td>284</td>
<td>0.696</td>
<td>-65.5</td>
</tr>
<tr>
<td>1600</td>
<td>1.2729</td>
<td>28.166</td>
<td>567</td>
<td>0.3292</td>
<td>268</td>
<td>0.697</td>
<td>-98.6</td>
</tr>
<tr>
<td>1500</td>
<td>1.2779</td>
<td>28.167</td>
<td>542</td>
<td>0.3245</td>
<td>252</td>
<td>0.699</td>
<td>-131.3</td>
</tr>
<tr>
<td>1400</td>
<td>1.2831</td>
<td>28.164</td>
<td>518</td>
<td>0.3198</td>
<td>236</td>
<td>0.700</td>
<td>-163.5</td>
</tr>
<tr>
<td>1300</td>
<td>1.2886</td>
<td>28.166</td>
<td>492</td>
<td>0.3150</td>
<td>221</td>
<td>0.702</td>
<td>-195.3</td>
</tr>
<tr>
<td>1200</td>
<td>1.2946</td>
<td>28.166</td>
<td>467</td>
<td>0.3100</td>
<td>205</td>
<td>0.704</td>
<td>-226.5</td>
</tr>
<tr>
<td>1100</td>
<td>1.3012</td>
<td>28.166</td>
<td>440</td>
<td>0.3048</td>
<td>190</td>
<td>0.706</td>
<td>-257.3</td>
</tr>
<tr>
<td>1000</td>
<td>1.3085</td>
<td>28.167</td>
<td>413</td>
<td>0.2993</td>
<td>174</td>
<td>0.708</td>
<td>-287.5</td>
</tr>
<tr>
<td>900</td>
<td>1.3171</td>
<td>384</td>
<td>293</td>
<td>0.2931</td>
<td>158</td>
<td>0.710</td>
<td>-317.1</td>
</tr>
<tr>
<td>800</td>
<td>1.3271</td>
<td>353</td>
<td>2862</td>
<td>142</td>
<td>0.713</td>
<td>-346.1</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>1.3382</td>
<td>321</td>
<td>2792</td>
<td>125</td>
<td>0.716</td>
<td>-374.3</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>1.3499</td>
<td>287</td>
<td>2722</td>
<td>109</td>
<td>0.719</td>
<td>-401.9</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.3614</td>
<td>251</td>
<td>2657</td>
<td>92</td>
<td>0.723</td>
<td>-428.8</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>1.2003</td>
<td>30.385</td>
<td>219</td>
<td>0.2507</td>
<td>76</td>
<td>0.717</td>
<td>-479.7</td>
</tr>
<tr>
<td>300</td>
<td>1.2489</td>
<td>32.246</td>
<td>181</td>
<td>0.2393</td>
<td>61</td>
<td>0.706</td>
<td>-528.0</td>
</tr>
</tbody>
</table>

\(^a\)Properties at this temperature reflect the effect of the condensation of water from the combustion products.
<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, $\gamma$</th>
<th>Molecular weight, m</th>
<th>Viscosity, $\mu$, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, $c_p$, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, $h$, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1860</td>
<td>27.704</td>
<td>$844 \times 10^{-6}$</td>
<td>0.5365</td>
<td>$763 \times 10^{-6}$</td>
<td>0.593</td>
<td>269.4</td>
</tr>
<tr>
<td>2700</td>
<td>1.1946</td>
<td>27.788</td>
<td>822</td>
<td>0.4952</td>
<td>664</td>
<td>0.613</td>
<td>217.9</td>
</tr>
<tr>
<td>2600</td>
<td>1.2039</td>
<td>27.852</td>
<td>800</td>
<td>0.4594</td>
<td>582</td>
<td>0.631</td>
<td>170.2</td>
</tr>
<tr>
<td>2500</td>
<td>1.2135</td>
<td>27.897</td>
<td>777</td>
<td>0.4298</td>
<td>516</td>
<td>0.647</td>
<td>125.8</td>
</tr>
<tr>
<td>2400</td>
<td>1.2226</td>
<td>27.929</td>
<td>755</td>
<td>0.4064</td>
<td>465</td>
<td>0.660</td>
<td>84.0</td>
</tr>
<tr>
<td>2300</td>
<td>1.2309</td>
<td>27.950</td>
<td>732</td>
<td>0.3886</td>
<td>424</td>
<td>0.671</td>
<td>44.3</td>
</tr>
<tr>
<td>2200</td>
<td>1.2380</td>
<td>27.963</td>
<td>709</td>
<td>0.3753</td>
<td>392</td>
<td>0.678</td>
<td>6.2</td>
</tr>
<tr>
<td>2100</td>
<td>1.2442</td>
<td>27.972</td>
<td>686</td>
<td>0.3652</td>
<td>366</td>
<td>0.684</td>
<td>-30.8</td>
</tr>
<tr>
<td>2000</td>
<td>1.2496</td>
<td>27.977</td>
<td>662</td>
<td>0.3574</td>
<td>344</td>
<td>0.688</td>
<td>-66.9</td>
</tr>
<tr>
<td>1900</td>
<td>1.2545</td>
<td>27.980</td>
<td>639</td>
<td>0.3511</td>
<td>325</td>
<td>0.691</td>
<td>-102.4</td>
</tr>
<tr>
<td>1800</td>
<td>1.2591</td>
<td>27.981</td>
<td>615</td>
<td>0.3457</td>
<td>307</td>
<td>0.693</td>
<td>-137.2</td>
</tr>
<tr>
<td>1700</td>
<td>1.2635</td>
<td>27.982</td>
<td>591</td>
<td>0.3407</td>
<td>290</td>
<td>0.695</td>
<td>-171.5</td>
</tr>
<tr>
<td>1600</td>
<td>1.2680</td>
<td>27.983</td>
<td>566</td>
<td>0.3361</td>
<td>273</td>
<td>0.697</td>
<td>-205.3</td>
</tr>
<tr>
<td>1500</td>
<td>1.2727</td>
<td>27.983</td>
<td>542</td>
<td>0.3314</td>
<td>257</td>
<td>0.698</td>
<td>-238.7</td>
</tr>
<tr>
<td>1400</td>
<td>1.2777</td>
<td>27.986</td>
<td>517</td>
<td>0.3267</td>
<td>241</td>
<td>0.700</td>
<td>-271.6</td>
</tr>
<tr>
<td>1300</td>
<td>1.2831</td>
<td>27.986</td>
<td>491</td>
<td>0.3219</td>
<td>225</td>
<td>0.702</td>
<td>-304.1</td>
</tr>
<tr>
<td>1200</td>
<td>1.2890</td>
<td>27.989</td>
<td>465</td>
<td>0.3167</td>
<td>209</td>
<td>0.704</td>
<td>-336.0</td>
</tr>
<tr>
<td>1100</td>
<td>1.2955</td>
<td>27.989</td>
<td>438</td>
<td>0.3113</td>
<td>193</td>
<td>0.707</td>
<td>-367.4</td>
</tr>
<tr>
<td>1000</td>
<td>1.3028</td>
<td>27.989</td>
<td>410</td>
<td>0.3055</td>
<td>177</td>
<td>0.709</td>
<td>-398.2</td>
</tr>
<tr>
<td>900</td>
<td>1.3115</td>
<td>27.990</td>
<td>381</td>
<td>0.2990</td>
<td>160</td>
<td>0.712</td>
<td>-428.5</td>
</tr>
<tr>
<td>800</td>
<td>1.3215</td>
<td>27.990</td>
<td>350</td>
<td>0.2919</td>
<td>143</td>
<td>0.715</td>
<td>-458.0</td>
</tr>
<tr>
<td>700</td>
<td>1.3326</td>
<td>27.992</td>
<td>318</td>
<td>0.2845</td>
<td>126</td>
<td>0.718</td>
<td>-486.8</td>
</tr>
<tr>
<td>600</td>
<td>1.3444</td>
<td>27.993</td>
<td>284</td>
<td>0.2772</td>
<td>109</td>
<td>0.722</td>
<td>-514.9</td>
</tr>
<tr>
<td>500</td>
<td>1.3561</td>
<td>27.993</td>
<td>248</td>
<td>0.2704</td>
<td>92</td>
<td>0.727</td>
<td>-542.3</td>
</tr>
<tr>
<td>a400</td>
<td>1.1915</td>
<td>31.235</td>
<td>218</td>
<td>0.2508</td>
<td>76</td>
<td>0.718</td>
<td>-604.4</td>
</tr>
<tr>
<td>a300</td>
<td>1.2279</td>
<td>33.148</td>
<td>181</td>
<td>0.2391</td>
<td>61</td>
<td>0.706</td>
<td>-653.7</td>
</tr>
</tbody>
</table>

*Properties at this temperature reflect the effect of the condensation of water from the combustion products.*
TABLE IX. - Continued. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 40 ATMOSPHERES

(f) Fuel-air ratio, 0.06

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, ( \gamma )</th>
<th>Molecular weight, ( m )</th>
<th>Viscosity, ( \mu ), g/(cm)(sec)</th>
<th>Specific heat at constant pressure, ( c_p ), cal/(g)(K)</th>
<th>Thermal conductivity, ( k ), cal/(cm)(sec)(K)</th>
<th>Prandtl number, ( Pr )</th>
<th>Enthalpy ( h ), cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1770</td>
<td>27.369</td>
<td>845x10^{-6}</td>
<td>0.5901</td>
<td>838x10^{-6}</td>
<td>0.595</td>
<td>197.1</td>
</tr>
<tr>
<td>2700</td>
<td>1.1833</td>
<td>27.480</td>
<td>823</td>
<td>0.5494</td>
<td>738</td>
<td>0.613</td>
<td>140.2</td>
</tr>
<tr>
<td>2600</td>
<td>1.1908</td>
<td>27.571</td>
<td>801</td>
<td>0.5115</td>
<td>653</td>
<td>0.628</td>
<td>87.2</td>
</tr>
<tr>
<td>2500</td>
<td>1.1992</td>
<td>27.642</td>
<td>779</td>
<td>0.4773</td>
<td>580</td>
<td>0.641</td>
<td>37.8</td>
</tr>
<tr>
<td>2400</td>
<td>1.2083</td>
<td>27.697</td>
<td>756</td>
<td>0.4471</td>
<td>519</td>
<td>0.651</td>
<td>-8.4</td>
</tr>
<tr>
<td>2300</td>
<td>1.2179</td>
<td>27.737</td>
<td>733</td>
<td>0.4210</td>
<td>468</td>
<td>0.660</td>
<td>-51.8</td>
</tr>
<tr>
<td>2200</td>
<td>1.2274</td>
<td>27.765</td>
<td>710</td>
<td>0.3991</td>
<td>425</td>
<td>0.667</td>
<td>-92.8</td>
</tr>
<tr>
<td>2100</td>
<td>1.2364</td>
<td>27.784</td>
<td>687</td>
<td>0.3815</td>
<td>388</td>
<td>0.674</td>
<td>-131.8</td>
</tr>
<tr>
<td>2000</td>
<td>1.2443</td>
<td>27.794</td>
<td>663</td>
<td>0.3680</td>
<td>358</td>
<td>0.681</td>
<td>-169.2</td>
</tr>
<tr>
<td>1900</td>
<td>1.2507</td>
<td>27.800</td>
<td>639</td>
<td>0.3584</td>
<td>334</td>
<td>0.686</td>
<td>-205.5</td>
</tr>
<tr>
<td>1800</td>
<td>1.2559</td>
<td>27.803</td>
<td>615</td>
<td>0.3516</td>
<td>313</td>
<td>0.690</td>
<td>-241.0</td>
</tr>
<tr>
<td>1700</td>
<td>1.2603</td>
<td>27.804</td>
<td>591</td>
<td>0.3464</td>
<td>295</td>
<td>0.693</td>
<td>-275.9</td>
</tr>
<tr>
<td>1600</td>
<td>1.2644</td>
<td>27.805</td>
<td>566</td>
<td>0.3419</td>
<td>278</td>
<td>0.696</td>
<td>-310.3</td>
</tr>
<tr>
<td>1500</td>
<td>1.2687</td>
<td>27.800</td>
<td>541</td>
<td>0.3375</td>
<td>262</td>
<td>0.698</td>
<td>-344.3</td>
</tr>
<tr>
<td>1400</td>
<td>1.2732</td>
<td>27.800</td>
<td>515</td>
<td>0.3331</td>
<td>245</td>
<td>0.700</td>
<td>-377.8</td>
</tr>
<tr>
<td>1300</td>
<td>1.2783</td>
<td>27.800</td>
<td>489</td>
<td>0.3283</td>
<td>229</td>
<td>0.702</td>
<td>-410.9</td>
</tr>
<tr>
<td>1200</td>
<td>1.2839</td>
<td>27.800</td>
<td>463</td>
<td>0.3232</td>
<td>212</td>
<td>0.705</td>
<td>-443.4</td>
</tr>
<tr>
<td>1100</td>
<td>1.2903</td>
<td>27.800</td>
<td>436</td>
<td>0.3176</td>
<td>196</td>
<td>0.707</td>
<td>-475.5</td>
</tr>
<tr>
<td>1000</td>
<td>1.2976</td>
<td>27.800</td>
<td>408</td>
<td>0.3116</td>
<td>179</td>
<td>0.710</td>
<td>-506.9</td>
</tr>
<tr>
<td>900</td>
<td>1.3063</td>
<td>27.800</td>
<td>378</td>
<td>0.3048</td>
<td>162</td>
<td>0.713</td>
<td>-537.8</td>
</tr>
<tr>
<td>800</td>
<td>1.3163</td>
<td>27.800</td>
<td>347</td>
<td>0.2974</td>
<td>144</td>
<td>0.716</td>
<td>-567.9</td>
</tr>
<tr>
<td>700</td>
<td>1.3274</td>
<td>27.800</td>
<td>315</td>
<td>0.2897</td>
<td>127</td>
<td>0.720</td>
<td>-597.2</td>
</tr>
<tr>
<td>600</td>
<td>1.3392</td>
<td>27.800</td>
<td>280</td>
<td>0.2821</td>
<td>109</td>
<td>0.725</td>
<td>-625.8</td>
</tr>
<tr>
<td>500</td>
<td>1.3511</td>
<td>27.800</td>
<td>244</td>
<td>0.2750</td>
<td>92</td>
<td>0.731</td>
<td>-653.7</td>
</tr>
<tr>
<td>( a )400</td>
<td>1.1829</td>
<td>32.116</td>
<td>217</td>
<td>0.2509</td>
<td>76</td>
<td>0.719</td>
<td>-726.7</td>
</tr>
<tr>
<td>( a )300</td>
<td>1.2095</td>
<td>34.083</td>
<td>180</td>
<td>0.2388</td>
<td>61</td>
<td>0.706</td>
<td>-777.0</td>
</tr>
</tbody>
</table>

\( a \)Properties at this temperature reflect the effect of the condensation of water from the combustion products.
TABLE IX. - Concluded. THERMODYNAMIC AND TRANSPORT PROPERTIES OF THE COMBUSTION PRODUCTS OF NATURAL GAS AND AIR AT 40 ATMOSPHERES

(g) Fuel-air ratio, 0.06074 (stoichiometric)

<table>
<thead>
<tr>
<th>Temperature, T, K</th>
<th>Isentropic exponent, γ</th>
<th>Molecular weight, m</th>
<th>Viscosity, μ, g/(cm)(sec)</th>
<th>Specific heat at constant pressure, c_p, cal/(g)(K)</th>
<th>Thermal conductivity, k, cal/(cm)(sec)(K)</th>
<th>Prandtl number, Pr</th>
<th>Enthalpy, h, cal/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2800</td>
<td>1.1769</td>
<td>27.335</td>
<td>845×10^{-6}</td>
<td>0.5916</td>
<td>838×10^{-6}</td>
<td>0.597</td>
<td>193.6</td>
</tr>
<tr>
<td>2700</td>
<td>1.1831</td>
<td>27.446</td>
<td>823</td>
<td>.5509</td>
<td>737</td>
<td>.615</td>
<td>136.5</td>
</tr>
<tr>
<td>2600</td>
<td>1.1905</td>
<td>27.537</td>
<td>801</td>
<td>.5134</td>
<td>652</td>
<td>.631</td>
<td>83.4</td>
</tr>
<tr>
<td>2500</td>
<td>1.1987</td>
<td>27.609</td>
<td>779</td>
<td>.4796</td>
<td>579</td>
<td>.645</td>
<td>33.7</td>
</tr>
<tr>
<td>2400</td>
<td>1.2075</td>
<td>27.665</td>
<td>756</td>
<td>.4500</td>
<td>519</td>
<td>.656</td>
<td>-12.7</td>
</tr>
<tr>
<td>2300</td>
<td>1.2165</td>
<td>27.707</td>
<td>733</td>
<td>.4248</td>
<td>469</td>
<td>.665</td>
<td>-56.4</td>
</tr>
<tr>
<td>2200</td>
<td>1.2253</td>
<td>27.737</td>
<td>710</td>
<td>.4040</td>
<td>427</td>
<td>.672</td>
<td>-97.8</td>
</tr>
<tr>
<td>2100</td>
<td>1.2336</td>
<td>27.758</td>
<td>687</td>
<td>.3871</td>
<td>392</td>
<td>.678</td>
<td>-137.3</td>
</tr>
<tr>
<td>2000</td>
<td>1.2412</td>
<td>27.772</td>
<td>663</td>
<td>.3738</td>
<td>363</td>
<td>.683</td>
<td>-175.3</td>
</tr>
<tr>
<td>1900</td>
<td>1.2478</td>
<td>27.781</td>
<td>639</td>
<td>.3634</td>
<td>338</td>
<td>.687</td>
<td>-212.2</td>
</tr>
<tr>
<td>1800</td>
<td>1.2536</td>
<td>27.786</td>
<td>615</td>
<td>.3552</td>
<td>317</td>
<td>.690</td>
<td>-248.1</td>
</tr>
<tr>
<td>1700</td>
<td>1.2588</td>
<td>27.790</td>
<td>590</td>
<td>.3487</td>
<td>297</td>
<td>.693</td>
<td>-283.3</td>
</tr>
<tr>
<td>1600</td>
<td>1.2636</td>
<td>27.791</td>
<td>566</td>
<td>.3432</td>
<td>279</td>
<td>.695</td>
<td>-317.9</td>
</tr>
<tr>
<td>1500</td>
<td>1.2682</td>
<td>27.792</td>
<td>541</td>
<td>.3383</td>
<td>262</td>
<td>.697</td>
<td>-351.9</td>
</tr>
<tr>
<td>1400</td>
<td>1.2729</td>
<td>27.792</td>
<td>515</td>
<td>.3336</td>
<td>246</td>
<td>.700</td>
<td>-385.5</td>
</tr>
<tr>
<td>1300</td>
<td>1.2780</td>
<td>27.793</td>
<td>489</td>
<td>.3287</td>
<td>229</td>
<td>.702</td>
<td>-418.6</td>
</tr>
<tr>
<td>1200</td>
<td>1.2837</td>
<td>27.793</td>
<td>463</td>
<td>.3235</td>
<td>212</td>
<td>.705</td>
<td>-451.3</td>
</tr>
<tr>
<td>1100</td>
<td>1.2900</td>
<td>27.793</td>
<td>435</td>
<td>.3180</td>
<td>196</td>
<td>.707</td>
<td>-483.3</td>
</tr>
<tr>
<td>1000</td>
<td>1.2973</td>
<td>27.792</td>
<td>407</td>
<td>.3120</td>
<td>179</td>
<td>.710</td>
<td>-514.9</td>
</tr>
<tr>
<td>900</td>
<td>1.3059</td>
<td>27.792</td>
<td>378</td>
<td>.3052</td>
<td>162</td>
<td>.713</td>
<td>-545.7</td>
</tr>
<tr>
<td>800</td>
<td>1.3160</td>
<td>34.153</td>
<td>347</td>
<td>.2978</td>
<td>144</td>
<td>.716</td>
<td>-575.9</td>
</tr>
<tr>
<td>700</td>
<td>1.3271</td>
<td>34.153</td>
<td>314</td>
<td>.2901</td>
<td>127</td>
<td>.720</td>
<td>-605.3</td>
</tr>
<tr>
<td>600</td>
<td>1.3389</td>
<td>32.182</td>
<td>280</td>
<td>.2825</td>
<td>109</td>
<td>.725</td>
<td>-633.9</td>
</tr>
<tr>
<td>500</td>
<td>1.3508</td>
<td>32.182</td>
<td>243</td>
<td>.2753</td>
<td>92</td>
<td>.731</td>
<td>-661.8</td>
</tr>
<tr>
<td>400^a</td>
<td>1.1823</td>
<td>34.153</td>
<td>217</td>
<td>.2510</td>
<td>76</td>
<td>.719</td>
<td>-735.6</td>
</tr>
<tr>
<td>300^a</td>
<td>1.2083</td>
<td>34.153</td>
<td>180</td>
<td>.2388</td>
<td>61</td>
<td>.706</td>
<td>-786.0</td>
</tr>
</tbody>
</table>

^aProperties at this temperature reflect the effect of the condensation of water from the combustion products.