

Water Purification Systems



Over a quarter century or more, NASA has developed or studied several different types of water purification/recycling systems to meet the varying needs of manned spacecraft and future space outposts. This research has made water purification one of the broadest areas of aerospace technology transfer (see pages 55 and (110-113)).

One of the most recent systems developed for NASA is one designed by Photo-Catalytics, Inc. (PCI), Boulder, Colorado. A closed-loop system that repeatedly cleanses and recycles the same water for possible application in long-duration space-

craft, it employs a "photocatalysis" process in which light or radiant energy is the catalyst that sparks a chemical reaction.

The innovative technology uses chemically stable semiconductor powders — titanium dioxide, for example — to destroy

microorganisms and other organic water contaminants. Added to water polluted by organic compounds, the powder absorbs ultraviolet (UV) light from the Sun or from an artificial UV light source; the UV light triggers a reaction in which the organic pollutants are oxidized — literally "eaten up" — and converted to harmless carbon dioxide.

PCI is now marketing the technology for commercial use as the Photo-Catalytic Ultrapure Water System with initial focus on biomedical research and pharmaceutical manufacturing applications, where extremely pure process water is a requirement. **Above**, genetic researchers Drs. Larry Borish (left) and Jack Routes display the PCI unit they are

using in their work at the Jewish Center for Immunology and Respiratory Medicine, Denver, Colorado. The **photo below** offers a closer look at the PCI system.

The technology also has obvious application in manufacture of microchips, where water purity is essential to semiconductor efficiency, and it could find a broad market in cleansing industrial wastewater.

"The process can take anything organic out of water," says PCI president Gerald Cooper, a scientist who led the design effort on the company's NASA photocatalytic water purifier. Laboratory tests indicate that the process can remove organic compounds from extremely polluted wastewater, such as that generated by oil refineries. Cooper adds that heavy metal ions in the wastewater, such as lead or mercury, could be removed by variations of the same process. •

