

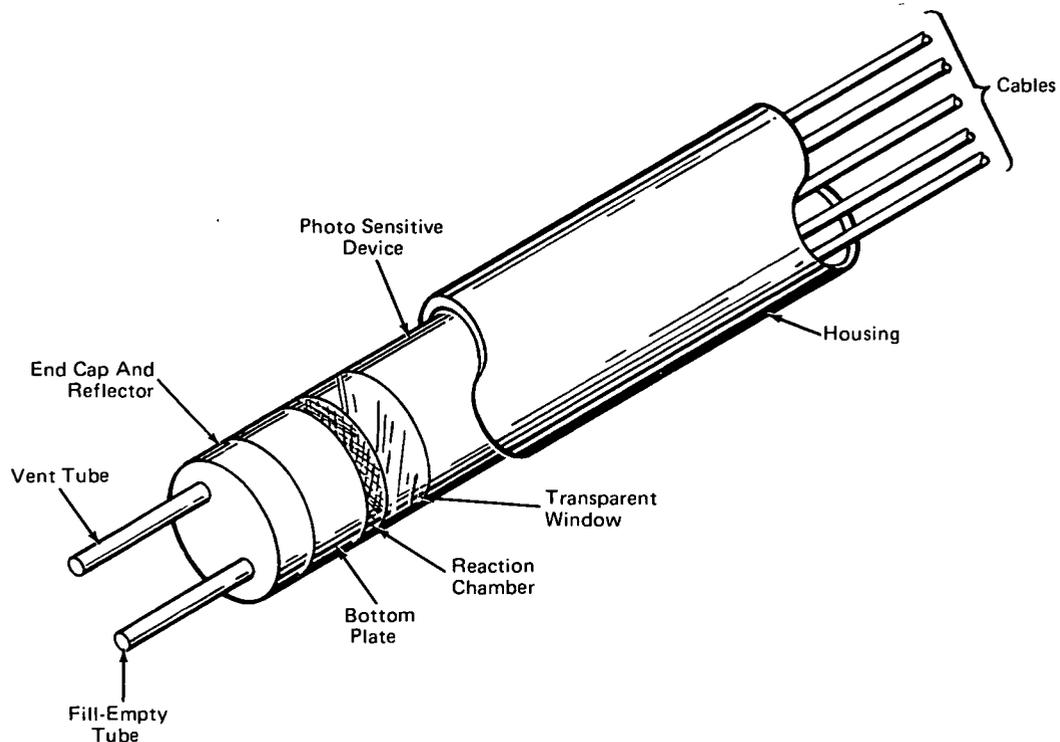
NASA TECH BRIEF

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A Reusable Prepositioned ATP Reaction Chamber



The problem:

A "luminescence biometer" detects the presence of life by means of the light-emitting chemical reaction of luciferin and luciferase (firstly enzyme) with the adenosine triphosphate (ATP) that occurs in all living cells. The amount of light in the reaction chamber is measured to determine the presence and extent of life. Existing chambers contain glass-air interfaces which attenuate the light, thus reducing the sensitivity of the instrument. In addition, they employ cuvettes or slides which require accurate positioning for optimum light output.

The solution:

A reaction chamber was developed which is prepositioned, has no glass-air interfaces, and is reusable.

How it's done:

The reaction chamber, shown in the figure, is cleaned and loaded with the firefly enzyme. An ATP sample is then quickly added through the inlet tube, and the resulting bioluminescence is measured with a photomultiplier.

(continued overleaf)

After measurement, the sample is removed through the same inlet tube. The chamber is then cleaned with a rinsing solution which is later discarded, leaving the chamber ready for the next test.

One of the advantages of this design is that it offers a facility to optimize the geometric optical relationship by permitting the flat reaction chamber to be assembled directly on the face of the detection device. Because of the prepositioned chamber, successive reactions can be conducted automatically without positioning the samples. The design is not limited to a single chamber volume; the volume can vary from 0.1 to over 10 ml.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
NASA Headquarters
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Patent status:

No patent action is contemplated by NASA.

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