CHEMISTRY

Zirconium Metal Produced

➤ DISCOVERY OF a new and efficient way of obtaining zirconium, a metal needed for use in atomic reactors and power plants, has been made through use of a new fluorine-containing organic chemical.

This was made known to the American Chemical Society meeting in New York by Dr. James O. Hendricks of the Minnesota Mining and Manufacturing Co., St. Paul, Minn., who told of new ways of using fluorine, once known principally as a dangerous gas.

Using the process of electrochemical fluorination developed by Dr. J. H. Simons of Pennsylvania State College, a series of perfluoro organic acids have been made. With a compound of one of these called TTA (thenoyl trifluoroacetone) zirconium can be separated from hafnium with which it occurs.

This separation is of interest to the Atomic Energy Commission presumably because zirconium resists high temperatures created in generating atomic power and because it is relatively stable against bombardment by neutrons, the triggers of the atomic bomb.

The greatest reduction in surface tension of water yet accomplished comes through use of higher perfluoro acids and their salts made by the same process. These will be used in electroplating and foaming processes.

New kinds of colorless, transparent thermoplastic resins result from reacting acetylene with a number of perfluoro acids.

Exceptional efficiency in flame extinguishing is shown by another new chemical, trifluoromethyl bromide, which gives relatively non-toxic substances after the flame is put out.

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CHEMISTRY

Declaration Preserved

➤ LONG LIFE is promised for the Declaration of Independence and the Constitution of the United States is expected as a result of extended investigation at the National Bureau of Standards in a joint program with the Library of Congress and the Libbey-Owens Ford Glass Company.

President Truman and other high government officials attended ceremonies Sept. 17, at which the sealed-in documents were placed on exhibition in the shrine at the Library of Congress.

The preservation of such valuable documents as these presents many difficulties if they are to be placed where they may be viewed by the public. They must be protected by a suitable transparent cover through which they can be seen. They must be preserved in an atmosphere containing no oxygen because oxygen is destructive to parchment.

The enclosure must contain the proper amount of moisture because too much or too little is harmful. Also the parchments must be protected from detrimental light radiation.

As a result of these studies, helium has been selected as the gas to use inside the enclosure because it is inert and does not enter into chemical reaction with any other substance as far as is known, and because it will not support living organisms that might cause destruction. The enclosure within which the documents and the helium are contained must be air-tight.

Relative humidity within the case should be maintained between 25% and 35% at room temperature, it was determined. This humidity is found to be best for the long-range durability of collagen, the protein material which is the basic constituent of parchment.

Radiation containing invisible ultraviolet light and visible blue and violet light damages documents such as the Declaration of Independence and the Constitution of the United States. Protection is now provided from such radiation by a cover door of laminated glass within which a plastic interlayer is incorporated of a material that will absorb the unwanted rays.

As a result of these studies, the two priceless documents are now sealed in air-tight envelopes, each envelope consisting of two panes of special glass bonded to a metal frame. Each document rests upon special pure cellulose backing paper in an inert atmosphere of almost pure helium, maintained at the proper humidity.

Facilities for detecting any gas leakage of the helium are provided. A thermal conductivity type of gas analyzer is employed. This detector is based upon the fact that each gas is unique in its ability to transfer heat. A change in the conductivity means there has been a change in the composition of the gas.

The Declaration and the Constitution are unique and irreplaceable documents. Except for a short period during the Revolutionary War, adequate measures of care have been taken in keeping with the scientific knowledge of the times. This care accounts for the present excellent condition of the documents.

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