

## GRAPHITE

The bulk of the domestic needs are met through imports. Because of the limited resource outlook for some grades of graphite and economic factors in other instances it seems apparent that reliance on imports will continue in the foreseeable future. Dependence upon uncertain sources for certain high-quality types of graphite could be minimized by perfecting capabilities to substitute among the various types of graphite and among graphites of the same type from different sources. (See section on carbon).

Improvements in the technology of synthesizing acceptable graphite-type substances from other carbon forms would minimize the uncertain supply outlook. At the present state of the art manufactured graphite does not compete well with natural graphite in most end uses.

## GYPSUM

Resources are, for all practical purposes, unlimited. Imports depend upon local transportation and economic advantages and have no bearing on availability. Demand relates directly to building and construction needs even though the commodity is employed in a variety of end-uses. The rate of growth in the gypsum industry would seem to rest upon the development of new gypsum-based products and the acceptance of such products by the building trades.

Byproduct gypsum discarded from the manufacture of phosphoric acid, presently a disposal problem, should find some utilization in gypsum-based products. Gypsum is seen as a potential commercial source of sulfur (sulfuric acid).

## HAFNIUM

The primary supply of hafnium is wholly a function of zirconium with which it is geochemically related in nature in a ratio of about 1 to 50 (see section on zirconium). Hafnium was not discovered until 1922 and has been available commercially for only a few years. Consequently, its ultimate employment is speculative. The only significant current use is in control rods in nuclear reactors where it has a number of acceptable competitors. Only its appearance as a necessary reject in the production of hafnium-free zirconium permits its commercial recovery and employment. Possibly, the significance of hafnium as an alloying element has not been fully explored.

## HELIUM

While traces of helium exist in the atmosphere and might be derived from other sources, these occurrences are academic and the only realistic resource is certain natural gases in which helium is present as a minor constituent. Much of the known helium-bearing gas is being marketed and, except for the helium extracted enroute, the contained helium is being depleted as an incident to the depletion of the natural gas. The prospect for discovering new resources of significant volume is not considered promising. Accordingly, attention is directed to the quantity of helium, that it would be practicable to recover with present technology, that is presently being wasted.

The Federal Government dominates the helium industry, although the private sector of the industry is growing and it is expected that private producers will aggressively seek to expand the uses for helium. The Federal Government agencies are also the dominant consumers in the United States and are required by law to obtain their major requirements from Government sources. The Government price is established to recover the costs of conserving some of the helium that would otherwise be wasted and, therefore, is higher than the price of helium from private sources. Some means of equalizing the cost of helium conservation programs between Federal and private sources deserves attention.

The technology of helium extraction is well advanced except that improvements in transportation methods promise a means of reducing costs at initial points of delivery. Also, ultimate supply can be extended by more efficient employment, recovery, and reuse practices in end-use applications.

Expanding and diversified uses for helium are probable. While the properties of helium preclude substitution by other gases in certain specialized applications, some large volume uses can be accommodated by other gases with minor inconveniences or cost differentials. However, because helium has been generally more expensive than the substitute materials, its use tends to be concentrated where technical or safety considerations dictate a preference. Lower helium