MOLECULAR SIEVE CARBON PERMSELECTIVE MEMBRANE. PART I. A NEW DEVICE FOR GAS MIXTURE SEPARATION

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A molecular sieve carbon membrane (MSCM) that contains no pores greater than those of molecular dimensions was produced by pyrolysis of organic compounds. The MSCM, an outcome of recent studies on molecular sieve carbon adsorbents, shows gas permeabilities and selectivities that are considerably greater than any of the presently known polymer membranes. The permeates examined were He, CO_2, O_2, N_2, and SF_6. The pore dimensions of the same starting carbon membrane may be adjusted by simple thermochemical treatments to achieve optimal separation power for any gas mixture composition.

HIGH TEMPERATURE SELECTIVE LEACHING OF URANIUM FROM RAW PHOSPHORITES

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In a recent study on the geochemistry of uranium in the phosphorites of the Zefa-Ef'eh field[1], it was observed that the concentration of U^{+6} was as high as 60-80% of the total uranium content. It is usually assumed that U^{+6} is not structurally bound to the phosphorite mineral but rather adsorbed on its surface, thus being amenable to selective leaching. It was therefore decided to investigate the possibility of recovering uranium from the Zefa-Ef'eh phosphorite by selective leaching with the expectation of relatively high yields.

High-temperature carbonate leaching was chosen. The following parameters were studied experimentally: sodium carbonate concentration in the leaching liquor (0.5-1.0 M), leaching temperature (100°-170°C) and pressure (1-4 atm), particle size of the phosphate, addition of oxidizers.

Leaching yields of uranium ranged from 12% to 15% irrespective of changes in process parameters, indicating that a considerable part of the U^{+6} may be somehow incorporated in the crystalline structure of the phosphorite. It was therefore concluded that uranium cannot be recovered economically from raw phosphate rock by selective

leaching, but only by complete decomposition of the phosphorite mineral.

REFERENCE:

1. Avital, Y., The geochemistry of uranium in the phosphorites of Zefa-Ef'eh field, M.Sc. thesis, Hebrew University, Jerusalem, 1980.

RESEARCH ON URANIUM FROM PHOSPHORIC ACID IN ISRAEL - PROGRESS AND PROSPECTS

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The economics of uranium recovery from phosphoric acid are very unfavorable at present because of the low prices of uranium and its high production cost.

The liquid-liquid contacting systems used to extract uranium from phosphoric acid are very sensitive to impurities that exist in the acid (mainly organic matter and finely dispersed solids). Moreover, they usually contaminate the barren acid with traces of solvents. Therefore, appropriate cleaning of the phosphoric acid is needed prior to the extraction of uranium as well as afterwards. It was estimated that expenses associated with these pre- and post- treatments of the phosphoric acid constitute a major part of the total investment and operating costs of uranium recovery facilites.

We are engaged in research and development aimed at improving the economics of uranium recovery from phosphates by developing new processes that simplify the required cleaning operations. The following two processes have been investigated.

a) The phosphogypsum route. By maintaining reductive conditions during the acidulation of phosphate rock to produce phosphoric acid, uranium can co-precipitate with solid compounds that form phosphogypsum. The uranium can be easily leached and recovered from the phosphogypsum which is separated from the phosphoric acid in the course of the production process. Thus, direct contact between phosphoric acid and solvent is avoided.

b) Solid extractants. Solid extractants, in contrast to liquid solvents, do not contaminate the barren phosphoric acid. Moreover, it is expected that the correct choice of operating technology can minimize their sensitivity to most of the impurities in the acid.