

Other metalloporphyrins did not show catalytic activity. Reduction potentials of the above metalloporphyrins determined from cyclic voltammograms indicate the importance of having a second energetically accessible oxidation state available to the metal ion for catalysis. The catalytic action of the above metalloporphyrins was considered in terms of inner and outer-sphere mechanisms. It was suggested that with the exception of Fe(III)TMPyP, which reacts via an inner-sphere mechanism, the others are governed by an outer-sphere mechanism.

REFERENCE:

1. Peretz, P., Solomon, D., Weinraub, D. and Faraggi, M., Int. J. Radiat. Biol., in press.

OXIDATION STATES OF URANIUM IN PHOSPHATE ORES[†]

H. Feldstein, R. Bircz and Y. Shiloni^{*}

The evaluation of the possibilities for selective extraction of uranium from phosphate ores requires information concerning its oxidation states, i.e. whether it forms soluble uranyl complexes or sparingly soluble U^{+4} compounds. Samples of phosphate ores from several fields, both exploited and recently discovered, were analyzed, and almost equal concentrations of uranium in the +4 and +6 oxidation states were found. Nevertheless there is some correlation between the concentrations of U^{+4} and organic matter, and the depth of the phosphate layer from which the sample was taken.

In ores containing 5-10% organic matter about 2/3 of the uranium was found in the +4 oxidation state, irrespective of the depth of the layer (depths between 1-100 cm were checked). In ores which contain ~0.5% organic material, the concentration of U^{+4} is highest in the upper layer and drops significantly (by a factor ~2) in deeper layers. This phenomenon cannot be attributed to selective leaching of U^{+6} from the upper layer, because the U/P_2O_5 ratio is highest in the upper layer. The above findings suggest that uranium was absorbed by the phosphates after the ore was already formed, probably from solutions which came in contact with

[†]This work was supported by the Ministry of Energy and Infrastructure

^{*} Geological Survey, Jerusalem

the upper layer, and then gradually dispersed in the lower layers by elution absorption processes. Correlation of these findings with known geological data may lead to a better understanding of the relation between uranium and phosphate ores.

OXIDATION STATES OF URANIUM IN PHOSPHATES AFTER THERMAL TREATMENT[†]

H. Feldstein and R. Bircz

Uranium in raw phosphate rock occurs in two oxidation states, +4 and +6. The oxidation process which starts at temperatures above 500°C is completed at about 600°C. The oxidation of uranium starts after most of the organic material in the ore has been decomposed, but still before the recrystallization of the apatite. At temperatures above 800°C, uranium concentrates in compounds which are insoluble in cold phosphoric acid, probably calcium uranate. The results are summarized in Table 2.

Table 2

Oxidation states of U in Oron phosphate at various temperatures
(total U concentration: 100 - 120 ppm)

Temperature (°C)	Heating time (h)	U ⁺⁴ (ppm)	U insoluble (ppm)
500	6	38.3	1.85±0.35
500 + O ₂	6	26.2±2.8	3.75±1.4
600	11	7	1.4
700	11	8	3.0
800	4	5.1	9.1±2.5
900	4	7.8	36
900	11	6.0	48
1000	11	5.8	83.3
Raw material	-	42.7±4.9	

[†]This work was supported by the Ministry of Energy and Infrastructure