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## LETTER

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### Separation of Selenium and Tellurium by Means of Cation Exchange Resin

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In the course of studying the analysis of high purity selenium the writer faced the need of separating selenium from tellurium. Reduction of selenite by sulphur dioxide is not only tedious but also unreliable when the amount of tellurium is less than the order of milligram.

A new method by Johnson and Kwan<sup>1)</sup> is found to be difficult to perform. Yoshino<sup>2)</sup> pointed out that selenium (as selenite) passes through cation exchange resin except when a large amount of iron is present, but he did not mention the behavior of tellurium.

The writer has observed that selenium can be separated from tellurium by applying the solution on a cation exchange resin column.

#### Experimental

(1) **Test solutions**:—(a) 99.95% selenium was dissolved in nitric acid, evaporated to dryness, sublimed twice, and the resultant selenium dioxide was dissolved in water. (b) 99.5% tellurium was

dissolved in nitric acid, evaporated to dryness, dissolved in the least possible amount of nitric acid; then filtered, and the filtrate was evaporated to drive off most of nitric acid.

The precipitated tellurous acid was washed with hot water, and finally dissolved in the least possible amount of nitric acid. Concentration of each solution was determined gravimetrically.

(2) **Resin column**:—10 ml. of Amberlite IR 120 (60 mesh) was used as HR type.

(3) **Procedure**:—25 ml. of slightly acid ( $<0.05$  N) solution, containing 50 to 1000  $\gamma$  of either selenium or tellurium or both, was dropped on the resin column at the rate of 2 ml./min., followed by 100 ml. of water, 100 ml. of 0.3 N hydrochloric acid and 100 ml. of 3 N hydrochloric acid. Every 25 ml. portion of the passed solution was examined for selenium and tellurium. The examination was made by the stannous chloride reduction method.

(4) **Results**:—Selenium was found in the first and second portions of the passed solution and in the third portion it was only faintly detected. In the fourth and fifth portions neither selenium nor tellurium seemed to be present. Tellurium appeared from the sixth to the ninth portion.

When the original solution contains iron, lead or copper in comparable amount to selenium or tellurium, heavy metals are separated as well as selenium and tellurium. Heavy metals are, of course, found in the portions later than the tenth.

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1) R. A. Johnson, F. A. Kwan: *Anal. Chem.*, **23**, 651 (1951).

2) Y. Yoshino: *J. Chem. Soc. Japan*, **71**, 577 (1950).