

have succeeded in separating ceric cerium not only from thorium but also from other rare earths including cerous cerium.

**Ceric Cerium:** Ten c.c. of the ceric solution containing not more than 0.5 gm. of ceric oxide and other elements are mixed with 120 c.c. of dilute (1:5) nitric acid and 70 c.c. of the periodate reagent in the cold (the periodate reagent is prepared by saturating 1:5 dilute nitric acid with the salt). The mixture is heated for 10 to 15 mins. on a vigorously boiling water-bath and left to settle. On cooling, it is filtered through a sintered glass crucible No. 4, and partially washed with 1:10 nitric acid. The precipitate is returned to the original beaker, dissolved in the minimum of concentrated nitric acid and diluted so that the acid concentration is approximately 2N., when the cerium periodate is reprecipitated. The precipitate is filtered and washed first with about 200 c.c. of dilute nitric acid (1:10) and finally with 100 c.c. of cold water. It is then dried for three to four hours at 100 to 110°C and weighed as  $CeHIO_6, H_2O$ .

**Thorium:** The filtrate is made distinctly alkaline with ammonia when thorium and other rare earths are precipitated as periodates. The precipitate is dissolved in dilute hydrochloric acid, potassium iodide is now added in sufficient quantity to decompose the periodate and the liberated iodine is boiled off. The oxalates of the elements are now precipitated after suitably adjusting the acidity, filtered, washed, and decomposed with nitric acid. The solution is neutralised until but faintly acidic to Congo Red, and the thorium is separated by any of the known methods (preferably adopting a double precipitation) ignited, and weighed as  $ThO_2$ .

**Rare Earths:** Oxalic acid is added in sufficient excess to the filtrate and the precipitated rare earths are washed, ignited, and weighed as  $R_2O_3$ .

In the absence of thorium however, the acid and the periodate ion concentrations may vary within wider limits.

In the following table are shown some typical results in which cerium, thorium and other rare earths are separated and individually estimated.

The importance of the strength of the acid during the analysis is shown by the following experiments. When nitric acid diluted in the ratio 1:4 is employed the amount of ceric periodate precipitated is only 0.4093 and 0.4119 gm. in two determinations and with

Taken:  $CeO_2$  0.1884 gm. +  $ThO_2$  0.1906 gm. + other rare earths including cerous cerium  $R_2O_3$  0.5700

Weight of $CeHIO_6, H_2O$ found	Weight of $CeO_2$ calculated	Weight of $ThO_2$ found	Weight of $R_2O_3$ found
gm.	gm.	gm.	gm.
0.4178	0.1882	0.1902	0.5698
0.4180	0.1883	0.1904	0.5694
0.4184	0.1884	0.1903	0.5698
0.4179	0.1882	0.1902	0.5696

nitric acid diluted in the ratio 1:6 the same is 0.4240 and 0.4251 gm. in the place of the correct amount 0.4184 gm. The precipitant in both cases was a saturated solution of potassium periodate in nitric acid of corresponding dilution.

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1. Ray Chaudary, *J. I. C. S.*, 1941, 18, 335.

#### TICK-BORNE RELAPSING FEVER IN KASHMIR

THE existence of Relapsing fever in Kashmir was first detected early in 1948. Previously the disease had remained unrecognised due to its mild symptoms, no fatality, and resemblance with Malaria. Two species of *Ornithodoros* ticks, *O. crossi* and *O. lahorensis*, were found widespread in the State, particularly infesting the animal quarters. *O. crossi* were found infected in nature and the disease conveyed to guinea pigs by their bite was similar to that produced by human-strains from local cases. It attacked man far more readily than *O. lahorensis*, also the bite marks on patients resembled those of the former. On the other hand, naturally infected specimens of *O. lahorensis* have not been found here so far, and lice could not be infected with the local strains. Therefore, it was considered that the vector of Relapsing fever in Kashmir was *O. crossi*. Detailed investigations will be published elsewhere.

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