SHORT COMMUNICATIONS

*Fractionation of Sulfur Isotopes during Oxidation**

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Many studies1) on the abundance of sulfur isotopes in natural sulfur compounds have been already carried out and it was learned that the heavy isotope, sulfur-34 is generally enriched in the compounds of higher oxidation state. When the difference of oxidation state between two compounds is greater, the fractionation of isotopes is more prominent.

An experiment was carried out to make clear the process of the fractionation of sulfur isotopes during oxidation and to explain the distribution of sulfur isotopes in nature using radioisotope, sulfur-35 as tracer. In these experiments radioactive zinc sulfide was prepared by introduction of hydrogen sulfide labelled with ^{35}S into zinc acetate solution. The precipitate of zinc sulfide was filtered and washed with ammonium acetate solution and suspended in ammoniacal solution. A part of the suspended sulfide, about one tenth of the total, was first oxidized to sulfate by adding carefully a definite volume of bromine water into the solution. The residual sulfide was filtered off, and the sulfate in the filtrate was precipitated as barium sulfate. The care against the fractional precipitation of sulfur isotopes, that had been described by the authors2), was also taken in this case. The residual sulfide precipitate was again suspended in ammoniacal ammonium acetate solution and partly oxidized with bromine water by the same manner as described above. The experiment was carried out sucessively till all the sulfide was consumed. About ten samples of barium sulfate for the determination of the radioactivity were obtained.

Their radioactivities were measured by the infinite-thickness method. Some of the experimental results obtained are shown in Fig. 1. If the fractionation of sulfur isotopes had not taken place during these processes, these samples should have had the same specific activity. However, there is a considerable and regular variation in their radioactivity and the earlier barium sulfate obtained in one series of fractional oxidation from one suspension has remarkably larger specific activity than that of the later. These variations are evidently beyond the possible experimental error. It might be too early to give definite conclusions on the mechanism of fractionation of sulfur isotopes from these results, but the isotope effect will be considered as the most important factor for the explanation of these phenomena and the fractionation of sulfur isotopes

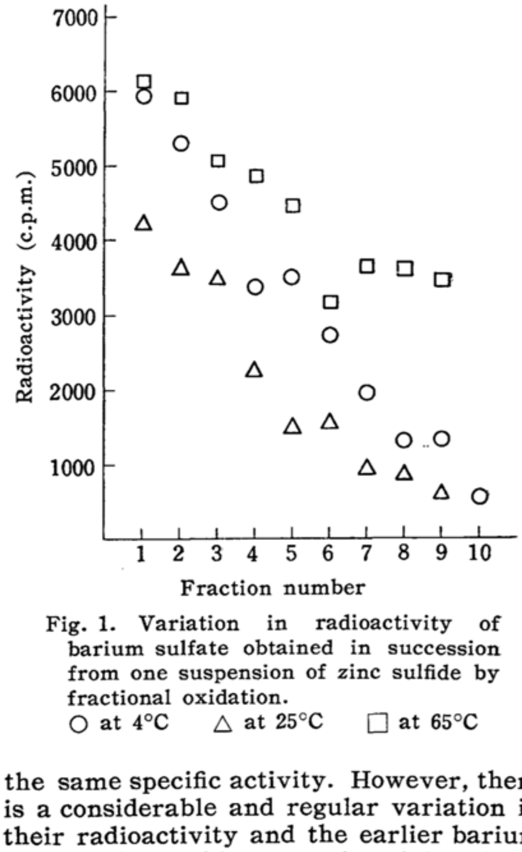

Fig. 1. Variation in radioactivity of barium sulfate obtained in succession from one suspension of zinc sulfide by fractional oxidation.
○ at 4°C △ at 25°C □ at 65°C

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1) H. G. Thode et al., *Can. J. Research*, **B27**, 361 (1949); **B28**, 567 (1950); A. P. Vinogradov et al., *Geokhimia*, **1**, 96 (1956); H. Sakai, *Geochim. et Cosmochim. Acta*, **12**, 150 (1957).

2) I. Iwasaki, S. Ikeda, H. Shimojima, H. Fukutomi and H. Sugano, *Annual Report of the Radioisotopes in Japan*, **3**, 1 (1956).

during oxidation seems to be one of the most important factors on the enrichment of the heavy sulfur isotope into the compounds of high oxidation state.

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