

tionation of the brain lipids, the acetone fraction had a marked inactivating action as well as a low surface tension; the ether and hot alcohol-ether fractions were only moderately active, irrespective of surface tension.

The inactivation of neurotropic viruses by serum lipids is now being investigated in connection with (a) the mechanism, including influence of the degree of dispersion, and closer identification of the active agent; (b) the bearing of the results on the neutralization test as it is now carried out; and (c) its possibilities as the basis for chemotherapy of experimental infections.

#### Reference

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## The Abundance of Thallium in the Earth's Crust

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The most generally accepted value for the abundance of thallium in the earth's crust is that given by Goldschmidt (2) as 0.00003 per cent Tl, by weight.

Although analytical data on the abundance of thallium in rocks are very meager (most analyses for thallium are confined to pegmatitic minerals), it should be possible to make a reasonably accurate estimate of its abundance in the earth's crust as a result of its close association with rubidium in minerals. It has been shown (1) that, with the exception of some sulfide minerals where thallium alone may be present, rubidium and thallium are confined essentially to potassium minerals and the cesium mineral, pollucite, and that in these the ratio Rb/Tl varies relatively slightly from area to area and is independent of the type of potassium host mineral (mean weight ratio per cent Rb/per cent Tl = 100). A plot of log per cent Rb<sub>2</sub>O vs. log per cent Tl<sub>2</sub>O for about 170 mineral specimens so far investigated, covering a thousand-fold concentration range, shows that throughout this range a straight line of unit slope accommodates the plotted points most satisfactorily. Consequently, one may infer that in the earth's crust as a whole the ratio Rb/Tl may be regarded as equal to about 100.

The value of the abundance of rubidium (0.03 per cent Rb) given by Goldschmidt (2) is probably reasonably accurate, although this value might be altered slightly because of several relatively recent rubidium determinations on rocks; hence the abundance of thallium in the earth's crust is 0.03/100 = 0.0003 per cent. One may infer, therefore, that the older value (0.00003 per cent) is low by a factor which may be as high as about 10.

It may be noted that, as mentioned above, thallium has a dual geochemical behavior and is usually present as a trace in many sulfides. In comparison with the quantity of thallium in the vast amounts of potash minerals, however, the thallium contained in relatively small quantities of sulfide minerals is probably insignificant; if significant, its presence in sulfide

minerals would tend to increase the factor of 10 referred to above.

#### References

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## Reaction of Certain Plant Growth Regulators With Ion Exchangers

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Several investigators have reported that 2,4-D and certain other plant growth regulators may be readily leached from some soils (2, 3, 5). The fact that large volumes of water did not always completely remove the 2,4-D would indicate that some of the compound may be adsorbed by the soil. It was recently shown that 2,4-D is inactivated by adsorption on charcoal (4).

The degree of adsorption of several plant growth regulators by certain ion exchange materials and the readiness with which the compounds are eluted after having been adsorbed are reported here.

The cation exchangers used were a resin exchanger, Amberlite IR-100,<sup>1</sup> a carbonaceous exchanger, Zeo-Karb H, a synthetic sodium aluminosilicate, Decalso, and a processed glauconite, Zeo-Dur. The anion exchangers were the amine resins, Amberlite IR-4B and De-Acidite.

All cation exchangers were screened -20 + 40 mesh. IR-100 and Zeo-Karb H were treated with a number of portions of 5 per cent hydrochloric acid, with frequent stirring, for a period of 48 hours; Decalso and Zeo-Dur, with several changes of 4 per cent sodium or calcium chloride over a period of 24 hours. After the materials were thoroughly washed with distilled water they were dried in an oven at 40°C. The anion exchange materials were prepared by stirring the samples with portions of 5 per cent sodium carbonate over a 24-hour period, washing, and then drying for about 5 hours at 40°C.

Six plant growth regulators were used for experimentation: 2,4-dichlorophenoxyacetic acid (2,4-D), ammonium 2,4-dichlorophenoxyacetate (NH<sub>4</sub>2,4-D), cupric 2,4-dichlorophenoxyacetate [Cu(2,4-D)<sub>2</sub>], calcium 2,4-dichlorophenoxyacetate [Ca(2,4-D)<sub>2</sub>], 2,4,5-trichlorophenoxyacetate (2,4,5-T), and isopropyl N-phenylcarbamate (IPPC). The 2,4-D was purified by running it through several salt-acid cycles. Cu(2,4-D)<sub>2</sub> was prepared by reacting an excess of an aqueous solution of NH<sub>4</sub>2,4-D with a solution of cupric chloride, and then washing the precipitate of Cu(2,4-D)<sub>2</sub> free of ammonium chloride. Ca(2,4-D)<sub>2</sub> was made by adding calcium chloride to an aqueous solution of NH<sub>4</sub>2,4-D. The spectrophotometric method developed by Bandurski (1) was employed to measure the compounds in solution.

Static trials were divided into two types: (1) those in which it was determined how much of a compound an exchanger material removed from a solution, and (2) those in which elution of regulators from exchangers was studied.

In static trials 0.5-gram samples of the exchanger were placed in 250-ml. Erlenmeyer flasks. Fifty ml. of the appro-

<sup>1</sup> The Amberlites were obtained from the Resinous Products and Chemical Company and other exchangers from the Permutit Company.