

## ABSTRACTS

### Decontamination of Radioactive Contaminants from Water with Vermiculite

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Although the ion exchange process is one of the most efficient methods for removing radioactivity from water, the cost of the ion exchange resins may limit widespread use unless suitable regeneration techniques are developed.

The clay mineral vermiculite exhibits the exchange of lattice ions, and the removal efficiencies of vermiculite do not appear to be significantly different from the sulfonic acid type cation exchange resins. In order to determine the breakthrough capacity of the vermiculite, a calcium chloride solution ( $10^{-3} M$  as Ca) was passed through a column filled with sodium form vermiculite regenerated by 3% sodium chloride solution, and fraction of the effluent were analysed for the calcium ion. And effect of acid treatment of the ore on the breakthrough capacity was examined.

The usable 10 per cent breakthrough capacities of 20 samples of vermiculite (20 to 60 mesh) were 0.26~0.58 (mean 0.40) and 0.38~0.83 (mean 0.58) meq./g. for 40 and 100 gram sodium chloride regenerant per liter. When the concentration of hydrochloric acid for the acid treatment of a sample was varied from 0.01 to 6 *M*, the maximum Na-Ca ion exchange capacities with 40, 60, 100, and 250 gram NaCl per liter regeneration level were 0.57, 0.78, 0.87, and 0.95 meq./ml., respectively. Using a 1 *M* hydrochloric acid for the acid treatment, the breakthrough capacities of the acid treated 20 samples were 0.29~0.65 (mean 0.46) and 0.36~0.87 (mean 0.63) meq./ml. for 40 and 100 gram per liter regeneration level. Among these raw ore samples, usable breakthrough capacity of brownish ores is higher than that of greenish ores, and this shows that the capacity depends on the chemical composition of vermiculite.

For the most effective removal of caesium and strontium from water, vermiculite is recommended. The removal efficiency of 99% or higher is possible.

### Synthesis of Polyoxazolidone and its Ring Cleavage

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Polymers)* **17**, 72(1960)

Some polyoxazolidones were prepared by the polyaddition of aliphatic or aromatic diisocyanate with diepoxy compounds. The products obtained are almost insoluble in organic solvents, and decompose above ca. 280°C without fusion. This may be due to some crosslinking which is formed after the polyaddition. The

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decarboxylative cleavage of oxazolidone rings in the polymer by refluxing with phosphoric acid followed by an alkaline treatment yielded an anion exchange resin of polyimine type. For example, a brown hard resin, having the exchange capacity of 3.2 meq/g, was, obtained from the addition polymer of tetramethylene diisocyanate with hydroquinone diglycidyl ether.

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### Syntheses of Polymers Having two Different Groups in 2:1 Ratio by Polycondensation

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Some diesters and diurethanes were prepared by the reactions of N-carbethoxy- $\epsilon$ -aminocaproyl chloride, 5-carbethoxy-pentylisocyanate, or N-carbethoxy-6-aminohexylisocyanate with ethyl  $\epsilon$ -aminocaproate, ethyl  $\epsilon$ -oxycaproate, N-carbethoxyhexamethylenediamine, or N-carbethoxy-6-aminohexanol. They contain one amide, urea, or urethane group in polymethylene linkage between two terminal ester or urethane groups. Syntheses of polymers having the regular structure of -A-A-B-type were attempted by the polycondensation reactions between the compounds described above and aliphatic diamines, diols, or dicarboxylic acids of 6 or 9 carbon atoms. Among hem polyamideureas showed a good fiber-forming property.

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### Synthesis of Condensation Polymer Having Pyrrolidone Group

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Polymers) 17, 685 (1960)*

Some bi-functional compounds containing one or two pyrrolidone rings were synthesized by the reaction of itaconic acid with ethylenediamine, hexamethylenediamine, and N-carbethoxyhexamethylenediamine etc., in water or basic solvent such as pyridine. By the polycondensation reaction between these compounds and aliphatic diamines, the polymers having amide or amide-urea groups were prepared. They have shown fiber-forming property, but are not suitable for textiles owing to their water-soluble property. Compared with polyvinyl-pyrrolidone (Albigen A), these polymers showed somewhat lower stripping power.