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NEWLY DISCOVERED, NON-METALLIC MINERAL DEPOSITS OF ECONOMIC VALUE IN MINNESOTA

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ABSTRACT

All facies of the Ordovician and Cambrian dolomites of southeastern Minnesota were sampled and analyzed to determine the ratio of silica to carbonates. The accompanying table gives a few representative analyses. By comparing analyses 5 and 6 it may be noted that the dolomitic limestone of the St. Lawrence formation has nearly the same chemical composition as typical commercial "wool rock." From a study of field relations it was found that the St. Lawrence formation is readily accessible for quarrying at many locations. Its silicious and dolomitic limestone beds vary from 25 feet to 40 feet in thickness and are continuous over large areas. Thus great tonnage is available as a source of raw material for the manufacture of rock wool. A large capacity plant is now under construction at Red Wing.

ANALYSES OF DOLOMITIC LIMESTONES OF MINNESOTA

Sample No.	Ign. Loss	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO
1	40.7	5.44	1.62	1.78	41.36	7.73
2	35.50	13.18	2.24	4.60	31.40	9.91
3	41.3	9.52	1.22	1.20	29.02	17.19
4	44.0	4.06	1.51	.94	29.80	18.89
5	24.9	34.88	1.53	6.61	16.60	10.73
6	26.38	29.30	.81	9.50	22.73	9.56

1. Galena formation from road cut outcrop three miles north of Nearstrand.
2. Platteville formation in quarry at east end of the Mendota Bridge over the Minnesota River at Ft. Snelling.
3. Shakopee formation from outcrop along the bank of Cannon River at Waterford.
4. Oneota from quarry 1 mile north of Merriam Junction.
5. St. Lawrence formation at base of Barn Bluff, Red Wing.
6. Commercial "Wool Rock." An average analysis of rock suitable for the manufacture of rock wool.

The Galena formation of Ordovician age contains a shale member known as the Decorah shale. In the area of the Twin Cities it is excavated and used in the manufacture of brick and tile. In the region east and southeast of Rochester, the Decorah shale occurs under a very thin mantle of glacial drift and loess. Recent studies in such regions show that the downward percolating meteoric waters

have altered its physical and chemical properties so that its clayey residue behaves as a typical bleaching clay or Fullers Earth. Such clays are used for decolorizing of mineral, vegetable and animal oils and for fulling cloth. The naturally active clays are employed chiefly for bleaching edible oils. The bleaching action is thought to be due to the selective adsorption of coloring matter on the exposed particle surfaces which are in contact with the liquid to be decolorized. The adsorption is due to the presence of chemically open bonds or free valences on the surface. Good Fullers Earth is priced at from $10 to $15 per short ton. Many thousands of tons are available at or near the surface in Goodhue, Olmsted, Fillmore and Houston Counties.

BASE EXCHANGE PROPERTIES OF SYNTHETIC RESINS

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Baekeland in 1909 made available to us the first of the industrially important plastics. This was the condensation product of phenol and formaldehyde. It is interesting to note that despite the many types of resins which are now available, the first plastics developed, the phenol formaldehydes, are still today economically the most important.

Contrary to popular belief, the greatest tonnage goes into coatings of various types rather than into the molded and cast forms which are more easily identified by the public. The production of synthetic resins is still expanding rapidly as new uses are being found for them.

It was not until lately that attention was called to the fact that some of these resins possessed quite remarkable ion adsorption properties. This opens up an entirely new field of use for resins in the purification of water and the recovery of valuable metals from solution. The term base exchange is used in a reaction where metals replace each other. For example, a zeolite water softener operates by exchanging its sodium ions for the calcium and magnesium ions present in the water to be softened. These new resins are sometimes called "Organolites" because of the resemblance of their adsorptive properties to those of the inorganic zeolites. Besides their high capacities, one of the main advantages of these synthetic resins over the inorganic zeolites is their ability to withstand the action of dilute acids. Zeolites will gelatinize and break down in dilute acids whereas these resins as base exchange materials can repeatedly be regenerated with 2 or 5% hydrochloric, acetic, or sulfuric acids. This means that it is possible to recover heavy metal, such as copper, lead, bismuth, antimony, etc., which are difficult to recover