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INSOLUBLE RESIDUES OF THE LOWER MAGNESIAN DOLOMITE

by

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Open-File Report 35-3
4 p.

1935

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A STUDENT FEDERAL EMERGENCY RELIEF ADMINISTRATION PROJECT

THE UNIVERSITY OF WISCONSIN

1935

INTRODUCTION

Contents:

The samples of the Lower Magnesian dolomite, which were run for the purpose of determining their insoluble constituents, were collected by O'Connor and Gillies. The specimens were collected from a road cut in the S.E. ¼ of the N.W. ¼ of Sec. 9, T. 19 N., R. 11 W. which is in Buffalo county, Wisconsin. The order of the numbers of the samples begins at the bottom (the Lower Magnesian-Jordan contact) and progresses toward the top of the Lower Magnesian.

Method of procedure:

A macroscopic description of each sample was the first step in the laboratory work. Then about twenty-five grams of each specimen were weighed, and placed in a 250 cc. beaker. Hydrochloric acid of a one to one concentration was added until each beaker was about half full. This usually stood over night or until there was no further chemical reaction of the constituents. After all the insoluble substance had settled to the bottom of the beaker, the acid was decanted. The residue was washed several times to eliminate all the remaining acid.

The residue was divided into the silt-clay fraction and the sand fraction by straining through a 200 mesh screen. This is not an accurate method of division, as a 200 mesh screen has a 1/14 mm. size screen opening, while the largest silt dimension, by definition, is 1/16 mm. A very small amount of sand, therefore, may be considered to occur in the silt-clay fraction. The sand remained on top of the screen and was then transferred to watch glasses of known weight. The water was siphoned from the beakers which contained the silt and clay. These beakers and watch glasses were placed in an oven for the purpose of evaporating all the moisture. They were then weighed, and the actual weights of the two types of residues were figured. From these values the percentages of each of the silt-clay fractions and of the sand fractions were calculated.

A microscopic examination and description of the sand was made in reflected light under a binocular microscope. For the purpose of distinguishing quartz from feldspar, a petrographic microscope was used. Quartz was the most dominant mineral. In many sections feldspars were found, but they were not very abundant in any one section. A few grains of the feldspar possess albite twinning, while others have the type of twinning that is characteristic of microcline. Most of the feldspar grains have euhedral shapes and are thus probably authigenic. A few other feldspar grains have a zoned structure. The latter usually contain a feldspar nuclei with a cryptocrystalline structure encircling them. The zoned feldspars appear to be anhedral and are probably detrital. No attempt was made to classify the various feldspars.

The descriptions of the specimens and their insoluble residue contents are given below:

1. Sample # 1

Macroscopic description of sample: Fine-grained, hard, tough, firmly cemented, uneven fracture, possesses scattered secondary calcite crystals, gray-buff color.

Description of residue: 17.52% insoluble. Silt-clay fraction: 5.44%, greenish-gray. Sand: 12.08%, white, dominantly fine, angular to subangular, colorless feldspar-quartz sand. There are a few rather coarse, rounded, frosted, detrital, quartz grains. The residue contains some irregular masses of limonite, a small amount of organic matter and a few green grains which are probably glauconite. A mounted section under a petrographic microscope reveals diminantly quartz with a few feldspar grains showing both polysynthetic and microcline twinning.

2. Sample # 2

Macroscopic description of sample: Oolitic, rotten, poorly cemented, contains a few large brown calcite crystals, buff to brown color.

Description of sample: 20.42% insoluble. Silt-clay fraction: 0.68% brown. Sand: 19.74%, white. About 44% is composed of coarse, rounded, frosted, detrital, quartz grains, some of which contain black inclusions. A few of these grains are orange colored. About 49% of the residue is fine, angular to rounded, colorless, feldspar-quartz sand grains. There is some limonite, a small amount of organic matter, and a few green grains which are probably glauconite.

3. Sample # 3

Macroscopic description of sample: Medium to fine-grained, poorly cemented, rotten-looking, banded rock of blue to brown color.

Description of residue: 49.1% insoluble. Silt-clay fraction: 16%, gray. Sand: 33.1%, greenish-gray. About 45% is composed mainly of fine, angular to rounded, colorless grains of quartz, but there are also some feldspars. There are many coarse, rounded, frosted, detrital, quartz grains. Some of these grains have inclusions, and some are orange throughout. There are a number of irregular chert fragments, which are usually green, some limonite and a few green grains which are likely glauconite.

4. Sample # 4

Macroscopic description of sample: Fine to medium-grained,

very hard and tough, firmly cemented, contains algal structures and scattered calcite crystals, buff to gray.

Description of residue: 11. 12% insoluble. Silt-clay fraction: 5.64%, brown. Sand: 5.48%, brownish-gray. A number of frosted, detrital, quartz grains are present. There are also a few brown chert fragments and a few aggregates of limonite, which coat many of the grains. There are many fine, rough grains mainly of quartz but also some feldspar. The residue contains a few black, opaque grains of either illmenite or magnetite.

5. Sample # 5

Macroscopic description of sample: Medium to fine-grained, fairly well-cemented, white to brown.

Description of residue: 25.2% insoluble. Silt-clay fraction: 3.6%, dark green. Sand: 21.6%, white, dominantly rounded, frosted, detrital, quartz grains. There is a fair amount of limonite, some chert, and a small percentage of fine, colorless grains, some of which is feldspar but most of it is quartz.

6. Sample # 6

Macroscopic description of sample: Medium to fine-grained, very firmly cemented, greenish-gray to brown color.

Description of residue: 21.72% insoluble. Silt-clay fraction: 2.04%, blackish-gray. Sand: 19.69%, white, colorless, medium to fine grains--the larger ones are rounded and frosted, while the finer grains are angular. There are a few oolites. A mounted section under a petrographic microscope shows that the sand was dominantly quartz with a few feldspar grains possessing the microcline-type twinning.

7. Sample # 7

Macroscopic description of sample: Fine-grained, compact, firmly cemented, gray dolomite.

Description of residue: 2.76% insoluble. Silt-clay fraction: 2.6%, pinkish-brown. Sand: 0.16%, brownish, dominantly fine, angular to rounded, colorless grains of quartz and feldspar. There are a few fine, black opaque grains which are slightly magnetic and are probably illmenite.

8. Sample # 8

Macroscopic description of sample: Fine-grained, fairly well cemented, contains calcite crystals, gray-buff color.

Description of residue: 14.24% insoluble. Silt-clay fraction: 6%, creamy tan. Sand: 8.24%, gray, dominantly fine, angular to subangular, rough, colorless grains of quartz and feldspars. There are a few flakes of muscovite, some limonite, and a few black grains which seem to be slightly magnetic and may be illmenite.

9. Sample # 9

Macroscopic description of sample: Medium texture, compact, firmly cemented, dendritic, buff color.

Description of residue: 5.2% insoluble. Silt-clay fraction; 4.68%, buff color. Sand: 0.52%, white, dominantly fine, angular to subangular, colorless grains of quartz and feldspar. About 5% of the residue is composed of muscovite flakes, 5% of fine, black grains, 3% of limonite, and there is one detrital quartz grain.

10, Sample # 10

Macroscopic description of sample: Fine-grained, fairly well-cemented, compact yellowish-buff color.

Description of sample: 5.48% insoluble. Silt-clay fraction: 5.24%, gray. Sand: 0.24%, white with a few brown grains, dominantly fine, angular, colorless grains of quartz and feldspar. About 5% is muscovite, 5% is organic matter, and there is one detrital, quartz grain.

11. Sample # 11

Macroscopic description of sample: Uneven texture, soft, weak, massive, medium crystalline, buff to pink color.

Description of residue: 15.76% insoluble. Silt-clay fraction: 7.32%, soft gray. Sand: 8.44%, buff. There are a number of muscovite flakes, and quite a few green grains which are probably glauconite. There is a slight amount of limonite, and a small amount of organic matter. The remainder is composed of fine, angular, rough, colorless grains. A mounted section under the petrographic microscope reveals dominantly feldspar grains with some quartz and some green grains, which have a microcrystalline structure and are probably glauconite. The feldspars have both microcline and albite twinning. They also possess many comparatively large, dark, opaque inclusions. Most of the feldspars appear to be authigenic, as many possess sharp corners and edges and show their crystal outline.

12. Sample # 12

Macroscopic description of sample: Even texture, unevenly cemented, many black dendritic marks, light buff color.

Description of residue: 4.28% insoluble. Silt-clay fraction: 4.12%, buff. Sand: 0.16%, brown, fifteen detrital, quartz grains, some muscovite, much organic matter. About 40% of the sand is fine-grained feldspar-quartz sand.