Quadrant II – Transcript and Related Materials

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Notes

Carbonate Group

Introduction

Carbonate minerals are those minerals containing the carbonate ion, CO_3^{2-}. There are many minerals but most of them are rare. Commonly occurring minerals are calcite, aragonite, dolomite, siderite, etc.

1] Calcite: $CaCO_3$

Calcite is colourless or white and shows pearly or vitreous luster. Hardness of calcite is 3, with specific gravity- 2.7. Calcite gives white streak and can be easily identified by rhombohedral cleavage. It gives effervescence with dilute HCL. The solubility of calcite increases with increasing CO2 pressure and decreasing temperature. It is important rock forming mineral in sedimentary environment. It also occurs in igneous & metamorphic rocks. Calcite is the principal constituent of limestone and marble. These rocks are extremely common and make up a significant portion of Earth's crust. The properties of calcite make it one of the most widely used minerals. It is used as a construction material, abrasive, agricultural soil treatment, construction aggregate, pigment, pharmaceutical and more. The construction industry is the primary consumer of calcite in the form of limestone and marble. These rocks have been used as dimension stones and in mortar for thousands of years. Modern construction uses calcite in the form of limestone and marble to produce cement and concrete. Calcite has numerous uses as a neutralizer of acids. For hundreds of years, limestones and marbles have been crushed and spread on fields as an acid-neutralizing soil treatment. Marble is an attractive and easily worked rock that has long been used for monuments and sculptures.

2] Aragonite- $CaCO_3$

Aragonite is a carbonate mineral, one of the three most common naturally occurring crystal forms of calcium carbonate, CaCO3. It is formed by biological and physical processes, including precipitation from marine and freshwater environments. The crystal lattice of aragonite differs from that of calcite, resulting in a different crystal shape, an orthorhombic crystal system with acicular crystal. Aragonite may be columnar or fibrous. Aragonite is thermodynamically unstable at standard temperature and pressure, and tends to alter to calcite. Aragonite provides the materials necessary for much sea life and also keeps the pH of the water close to its natural level, to prevent the dissolution of biogenic calcium carbonate. Aragonite has been successfully tested for the removal of pollutants like zinc, cobalt and lead from contaminated wastewaters.

Physical properties

- **Colour:** White, red, yellow, orange, green, purple, grey, blue

- **Streak:** White - **Fracture:** Sub-conchoidal

- **Luster:** Vitreous, resinous on fracture surfaces

- **Hardness:** 3.5-4 - **Specific gravity:** 2.95

3] Dolomite- $CaMg(CO_3)_2$

Dolomite is a common rock-forming mineral. It is a calcium magnesium carbonate with a chemical composition of $CaMg(CO_3)_2$. It is the primary component of the sedimentary rock known as dolostone and the metamorphic rock known as dolomitic marble. Limestone that contains some dolomite is known as dolomitic limestone. Dolomite is very similar to the mineral calcite. Calcite is composed of calcium carbonate ($CaCO_3$), while dolomite is a calcium magnesium carbonate ($CaMg(CO_3)_2$). Dolomite and calcite can be differentiated based on their hardness and acid reaction. Calcite has a hardness of 3, while dolomite is slightly harder at 3.5 to 4. Calcite is also strongly reactive with cold hydrochloric acid, while dolomite will effervesce weakly with cold hydrochloric acid.

Physical properties

- **Colour:** Colourless, white, pink, green, grey, brown

- **Streak:** White - **Fracture:** conchoidal

- **Luster:** Vitreous

- **Hardness:** 3.5-4 - **Specific gravity:** 2.8-2.9

Uses of Dolomite

Dolomite as a mineral has very few uses. However, dolostone has an enormous number of uses because it occurs in deposits that are large enough to mine. The most common use of dolostone is in the construction industry. It is crushed and sized for use as a road base material, an aggregate in concrete, asphalt and railroad ballast. It is also calcined in the production of cement and cut into blocks of specific size known as "dimension stone."