

A SEMINAR ON

# CARBONATE ROCKS



# CONTENTS



- ❖ Introduction
- ❖ Classification of limestone
  - Folk Classification
  - Dunham Classification
- ❖ Properties Of Dolostone
- ❖ Formation Of Dolostone
- ❖ Uses Of Carbonate Rocks
- ❖ Conclusion
- ❖ Reference

# INTRODUCTION

Sedimentary rocks of chemical and biochemical origin are divided into two groups : evaporites and non-evaporites. Non-evaporites constitute the bulk of chemical and biochemical rocks. Among the non-evaporites the most important are the carbonate rocks.

**Carbonate rocks** are a class of sedimentary rocks composed primarily of carbonate minerals. The two major types are limestone, which is composed of calcite or aragonite (different crystal forms of  $\text{CaCO}_3$ ) and dolostone, which is composed of the mineral dolomite ( $\text{CaMg}(\text{CO}_3)_2$ ).

# LIMESTONE

**Limestone** is a sedimentary rock composed largely of the minerals calcite and aragonite, which are different crystal forms of calcium carbonate ( $\text{CaCO}_3$ ). Many limestones are composed from skeletal fragments of marine organisms such as coral or foraminifera.

Limestone makes up about 10% of the total volume of all sedimentary rocks. The solubility of limestone in water and weak acid solutions leads to karst landscapes, in which water erodes the limestone over thousands to millions of years. Most caves systems are through limestone bedrock.

# LIMESTONE



# DOLOSTONE

**Dolomite** is a carbonate mineral composed of calcium-magnesium carbonate  $\text{CaMg}(\text{CO}_3)_2$ . The term is also used to describe the sedimentary carbonate rock dolostone.

Dolostone (dolomite rock) is composed predominantly of the mineral dolomite with a stoichiometric ratio of 50% or greater content of magnesium replacing calcium, often as a result of diagenesis. Limestone that is partially replaced by dolomite is referred to as *dolomitic limestone*

# DOLOSTONE



# CLASSIFICATION OF LIMESTONE

Two major classification schemes, are used for identifying limestone and carbonate rocks

- ✓ **Folk classification**
- ✓ **Dunham classification**



# FOLK CLASSIFICATION



Robert L. Folk developed a classification system that places primary emphasis on the detailed composition of grains and interstitial material in carbonate rocks. Based on composition, there are three main components: allochems, Matrix, and cement. The Folk system uses two-part names; the first refers to the grains and the second is the root. It is helpful to have a petrographic microscope when using the Folk scheme, because it is easier to determine the components present in each sample.

# DUNHAM CLASSIFICATION

Dunham divides the rocks into four main groups based on relative proportions of coarser clastic particles. Dunham names are essentially for rock families. His efforts deal with the question of whether or not the grains were originally in mutual contact, and therefore self-supporting, or whether the rock is characterized by the presence of frame builders and algal mats. Unlike the Folk scheme, Dunham deals with the original porosity of the rock. The Dunham scheme is more useful for hand samples because it is based on texture, not the grains in the sample.

# PROPERTIES OF DOLOSTONE

The mineral dolomite crystallizes in the trigonal-rhombohedral system. It forms white, gray to pink, commonly curved (saddle shape) crystals, although it is usually massive. Unlike calcite, dolomite is a double carbonate, having a different structural arrangement.

# FORMATION OF DOLOSTONE

Vast deposits are present in the geological record, but the mineral is relatively rare in modern environments. Laboratory synthesis of stoichiometric dolomite has been carried out only at temperatures of greater than 100 °C (conditions typical of burial in sedimentary basins), even though much dolomite in the rock record appears to have formed in low-temperature conditions. The high temperature is likely to speed up the movement of calcium and magnesium ions so that they can find their places in the ordered structure within a reasonable amount of time. This suggests that the lack of dolomite that is being formed today is likely due to kinetic factors.

# USES OF CARBONATE ROCKS

Limestone is very common in architecture, especially in Europe and North America. Many landmarks across the world, including the Great pyramid and its associated complex in Giza, Egypt, are made of limestone. So many buildings in Kingston, Canada were constructed from it that it is nicknamed the 'Limestone City'.

It is the raw material for the manufacture of quicklime (calcium oxide), slaked lime (calcium hydroxide), cement, and mortar.

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Dolomite is used as an ornamental stone, a concrete aggregate, a source of magnesium oxide and in the pidgeon process for the production of magnesium. It is an important petroleum reservoir rock, and serves as the host rock for large strata-bound Mississippi Valley-type (MVT) ore deposits of base metals such as lead, zinc and copper. limestone is, dolomite is sometimes used in its place as a flux for the smelting of iron and steel. Large quantities of processed dolomite are used in the production of float glass.

Dolomite is also used as the substrate in marine (saltwater) aquariums to help buffer changes in pH of the water.

# CONCLUSION



- Carbonate rocks are a class of sedimentary rocks composed primarily of carbonate minerals
- Limestone found today in almost environments, both marine and non-marine
- Carbonate saturation in water is highest in tropical to warm
- Karst topography and caves are most common landscape in carbonate rocks
- Carbonate rocks was also a very popular building block in the Middle Ages in the areas where it occurred

# REFERENCE

## BOOKS



- Introduction to sedimentology
- Origin Of Sedimentary Rocks

## WEBSITES



- [www.google.com](http://www.google.com)
- [www.wikipedia.com](http://www.wikipedia.com)





**THANK YOU**

**YOU**