

Metamorphic Textures

Non-foliated

Formed under high heat and low pressure and have an interlocking grain appearance like marble

Foliated

Formed under earth's interior under high pressure and high heat in directed pressure, causing a banded appearance like schist

Types of Metamorphism

Contact metamorphism

Produces an **aureole** around an intrusive body and occurs when rock is heated by an igneous intrusion. Results in non-foliated textures eg, limestone to marble.

Regional metamorphism

Produces most metamorphic rocks which are usually very foliated, from areas that have undergone change in physical conditions like temp, pressure, and stress. eg, shale to slate

Regional metamorphism of basalt

Metamorphic rocks derived from basalt have more minerals containing iron and magnesium than slate and the foliation is less pronounced.

Greenschist - low grade; ferromagnesian mineral are hydrated to form chlorite.

Amphibolite - higher grade than greenschist; chlorite & other minerals lose water and convert to amphibole.

Granulite - high grade; amphiboles are further dehydrated to produce pyroxene and garnets; little orientation of the minerals

Subduction zone metamorphism

Special conditions of high pressure and low temp; rock exhibits foliation and is called blueschist; higher grade rock is called eclogite

Aureole - an area that surrounds metamorphized rock due to being in contact with an igneous intrusion

Metamorphism

Changes that happen when a rock is subjected to temps/pressures higher than where they formed.

Protolith can be any type of rock.

Recrystallization in the solid state

Change in texture and mineralogy of the rock due to the new environment

Protolith - Parent rock

Metamorphic Grade

Metamorphic grade

reflects the intensity/grade of metamorphism and is indicated by the sequential appearance of **index minerals** and by textures.

Common index minerals in ascending order of P/T: chlorite, muscovite (mica), biotite (mica), garnet, staurolite. quartz and feldspar are always stable.

Burial metamorphism is the mild alteration of rock that occurs in deep sedimentary basins and ocean trenches

Index minerals - a mineral that forms under specific pressure and temperature to provide metamorphic history.

Controlling Factors in Metamorphism

Heat: most important agent of metamorphism

Influences the mobility and reactivity of chemically active fluids and is the result of intrusive igneous bodies or earth's internal heat

Composition of protolith

Chemical composition is inherited from the parent rock

Pressure

Changes the physical characteristics of rocks

Confining pressure applies forces equally in all directions and causes harder and denser metamorphic rocks

Directed pressure applies unequal pressure in different directions and causes distortion

Chemically active fluids present

At depth, higher temps and pressures cause minerals to dehydrate. Ions are expelled with the water and can travel to cause recrystallization