Metamorphism:

It is chemical, physical and mineralogical changes which is occur on original rocks. (Igneous, Sedimentary and even metamorphic rocks).When these rocks are subjected to heating or pressure or both, The metamorphic rocks becomes stable under new conditions. All the metamorphism processes are happened in solid state with assistant of hydrothermal solutions which are present in Rock pores.

Agents of Metamorphism:

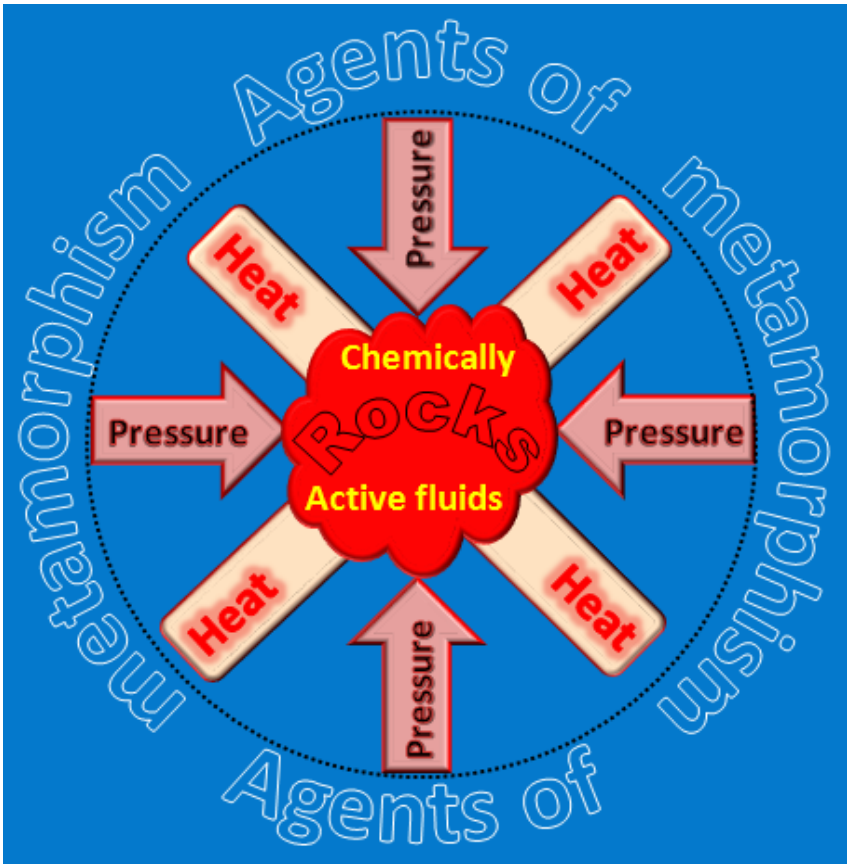
The agents of metamorphism are:

1- Heat.

2- Pressure (Stress).

3- Chemically active fluids.

These agents commonly acting together as shown in figure(1)



Figure(1) Heat, Pressure and chemically active fluids are acting together at metamorphism.

1- Heat:

Perhaps the most important agent of metamorphism is **heat,** because it provides the energy to drive chemical reactions. (Figure2)

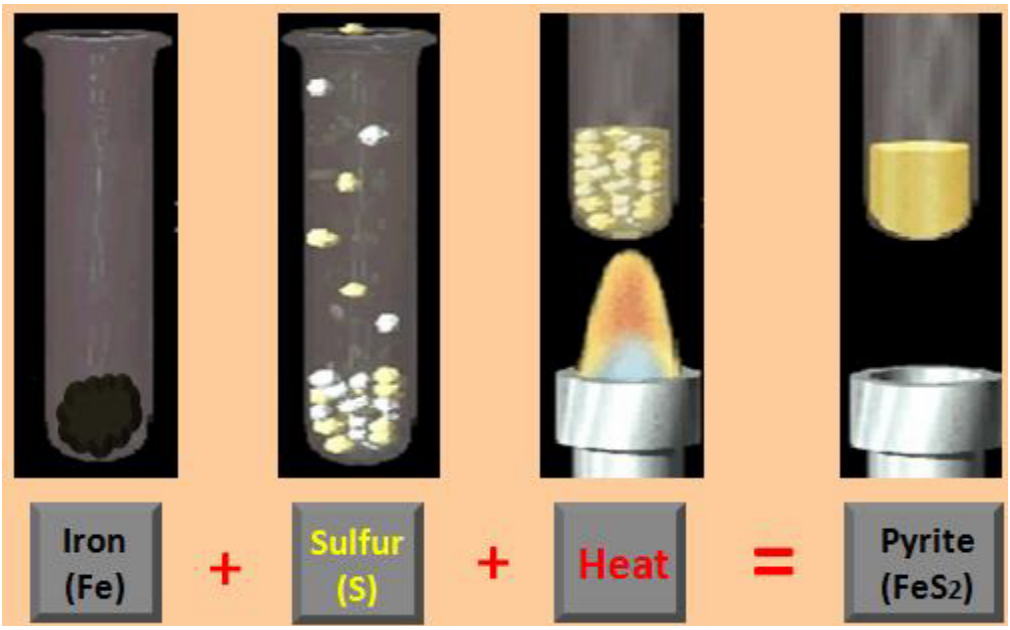
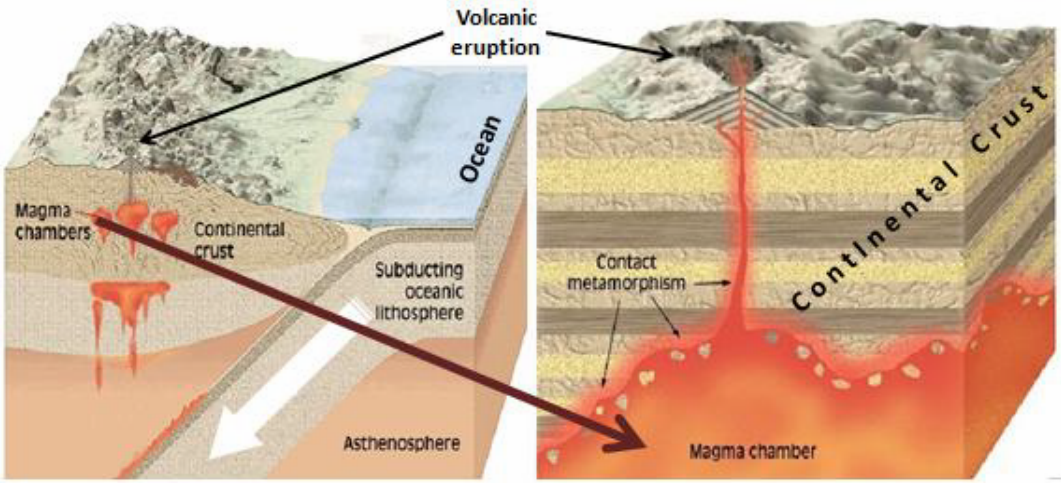


Figure.2: Heat is provideed the energy to drive chemical reactions

subjected to intense heat when they are faced by **magma**, a process called **contact metamorphism**

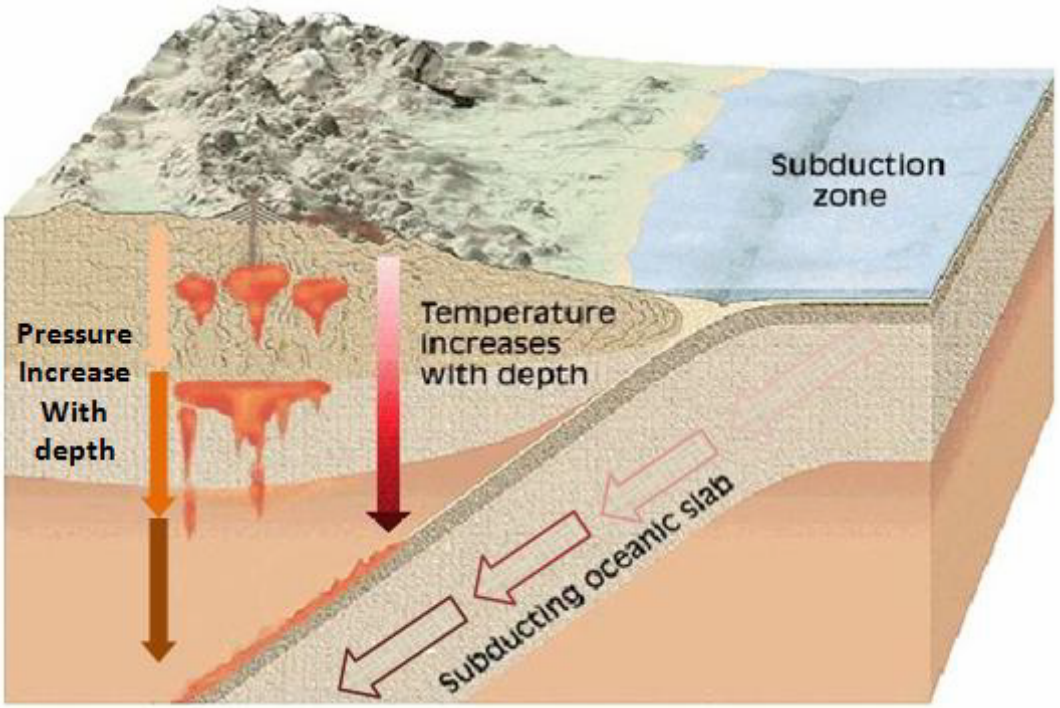
Here the adjacent host rock is "**baked**" by the emplaced magma. (Figure.3).



Rocks may also be subjected to high temperature if they are carried deep within earth.

2- Pressure:

Pressure, like temperature, also increases with depth



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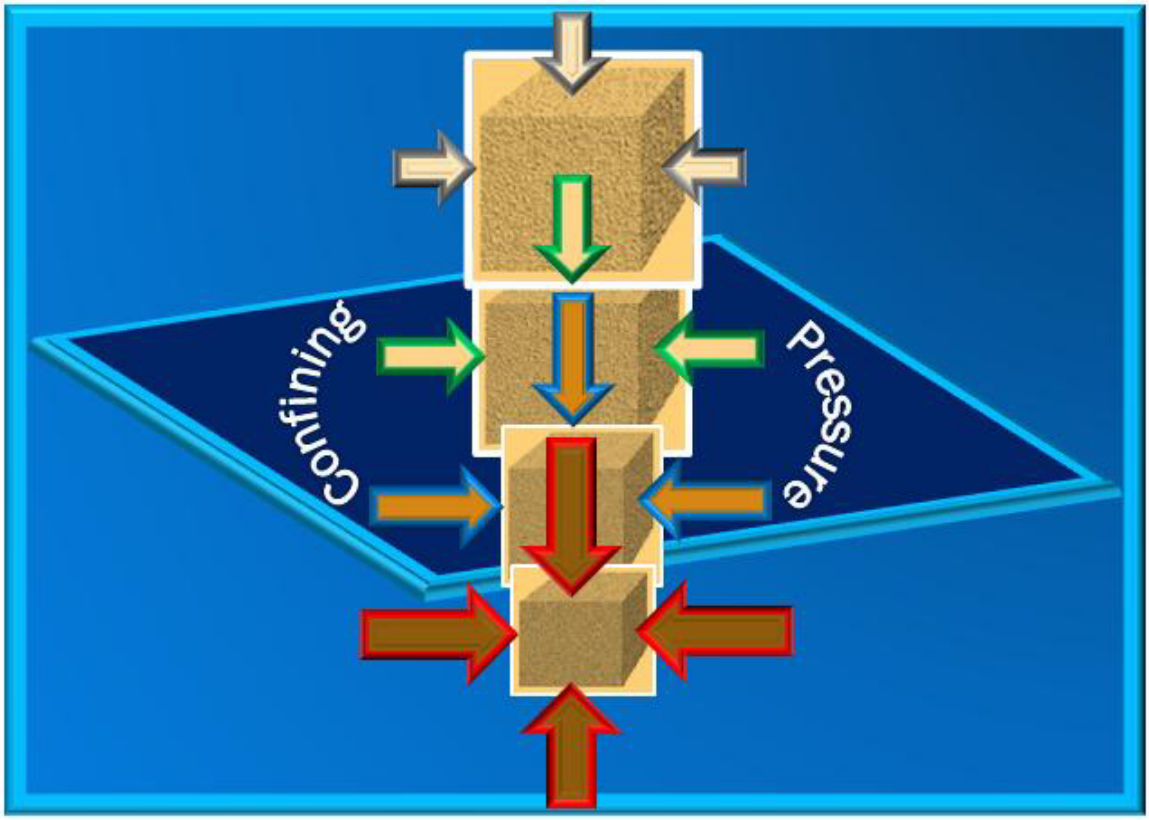
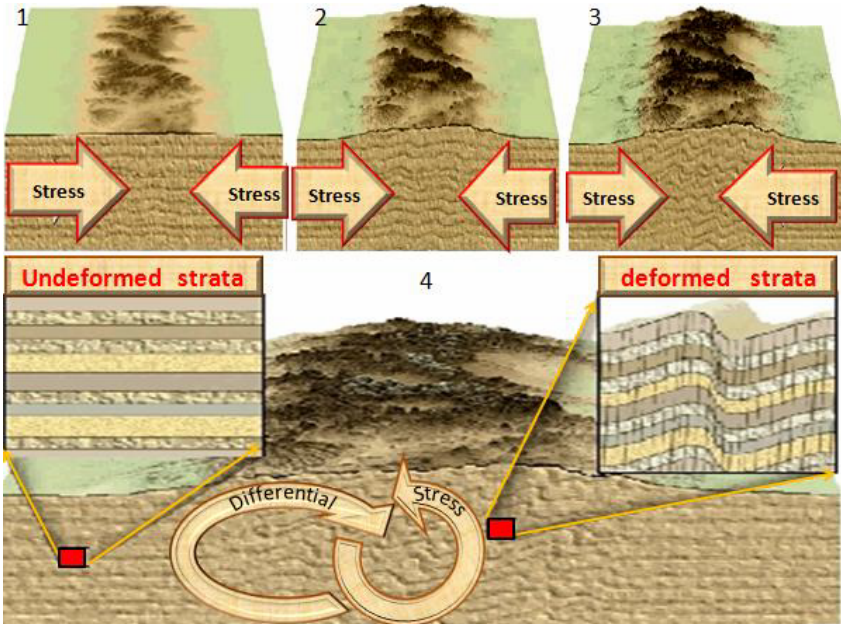


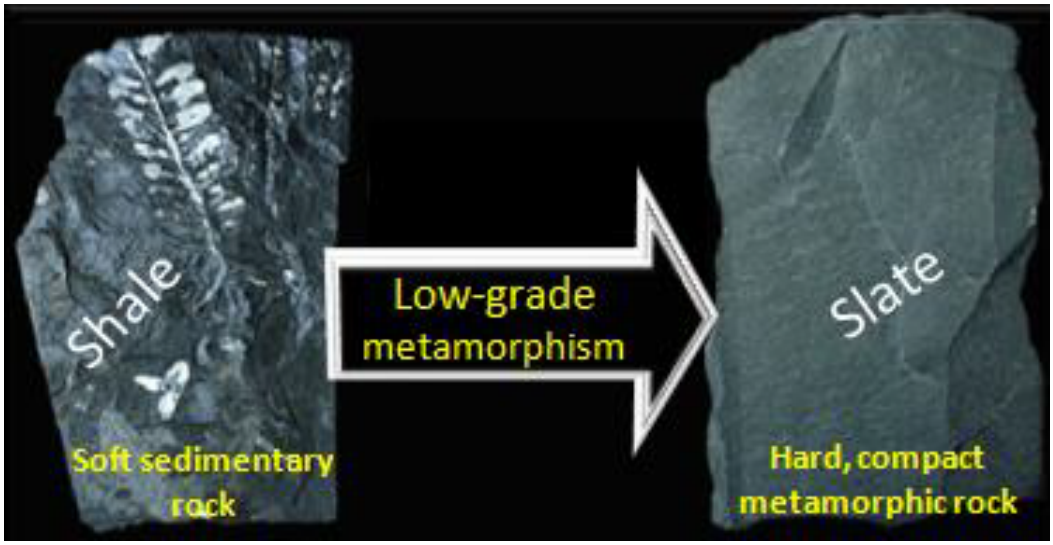
Confining pressure is applied equally in all directions and causes a reduction in rock volume

Rocks are also subjected to forces during mountain building that are unequal and in different directions, called **differential stress**

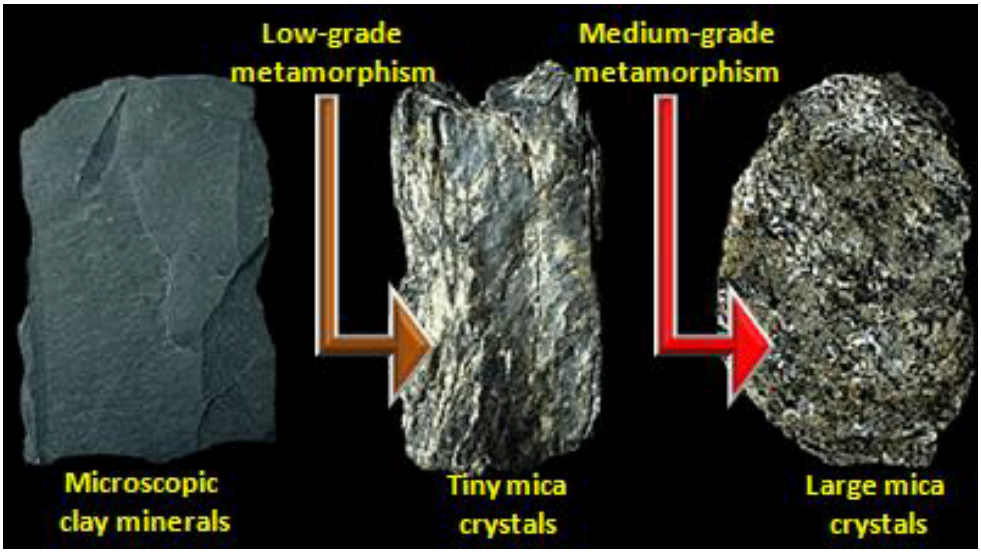


Textural and Mineralogical Changes:

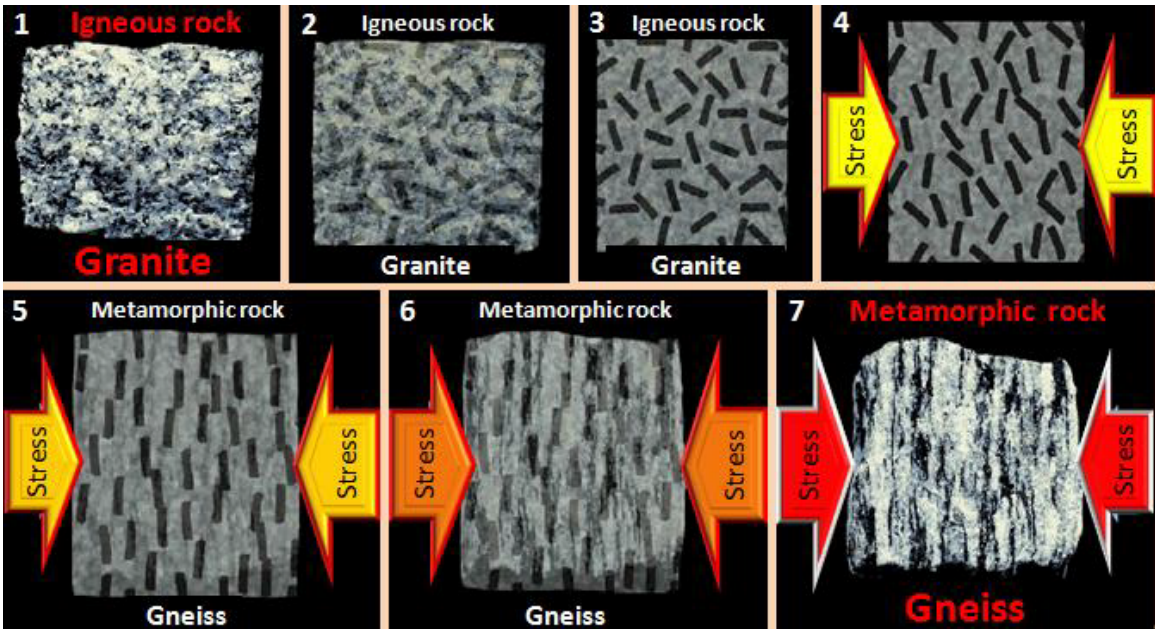
The degree of metamorphism is reflected in the rock's texture or mineral composition. When rocks are subjected to **low-grade metamorphism**, they become more compact and thus denser. (Figure.4.52).



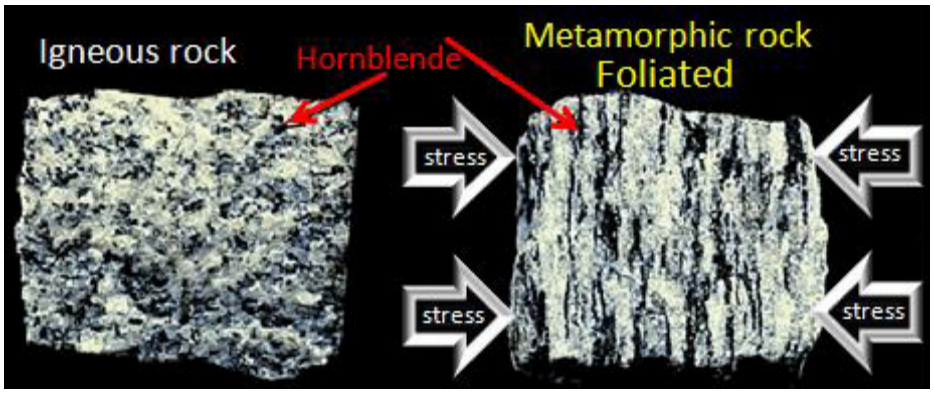
Under more extreme pressure and temperatures, some minerals **recrystallize** to form larger crystals



During metamorphism, the crystals of some minerals, such as micas which have a sheet structure, and hornblende which has an elongated structure, will recrystallize with a preferred orientation.
The new orientation will be essentially perpendicular to the direction of stress**.**



The resulting mineral alignment usually gives the rock **layered or banded** appearance termed **foliation**



Not all metamorphic rocks have a foliated texture.
Metamorphic rocks composed of only one mineral that forms equidimensional crystals are generally **nonaffiliated**