



Metamorphic rocks form when the crust is exposed to rising pressure and temperature conditions. What processes can raise the pressure and temperature of the crust?

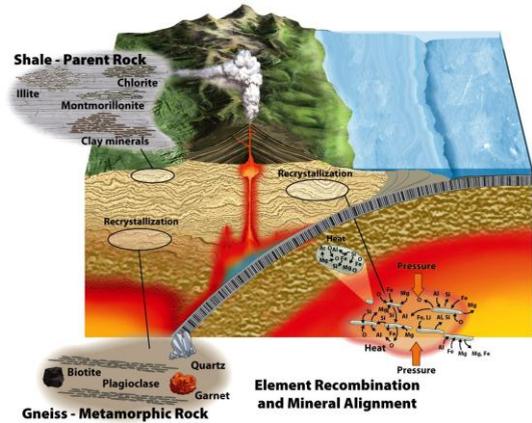
Metamorphic Rocks Are Composed of Sedimentary, Igneous, or Metamorphic Minerals that Have Recrystallized.

Marble from Carrara, Italy

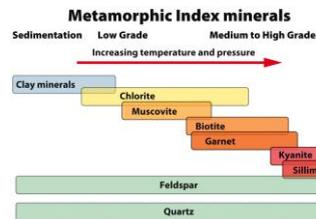
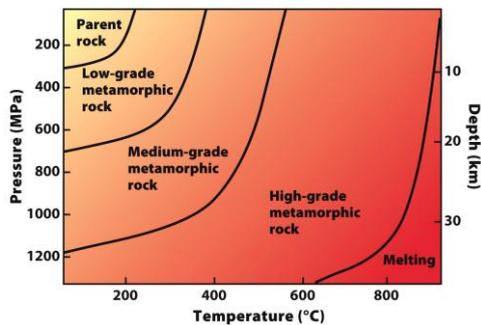


What Is Metamorphic Rock?

- Pre-existing sedimentary, igneous, or metamorphic rock changed to a new assemblage of minerals.
- Result of solid-state recrystallization of "parent rock" due to changing crustal conditions.



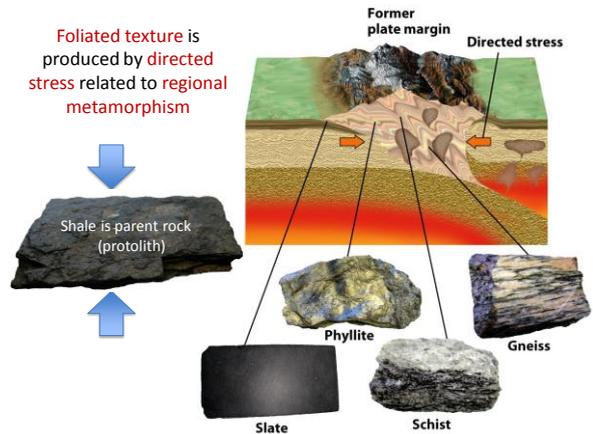
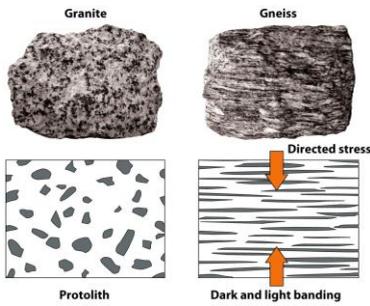
Rocks Evolve through a Sequence of Metamorphic Grades ...



... conveniently "indexed" by **Index Minerals**



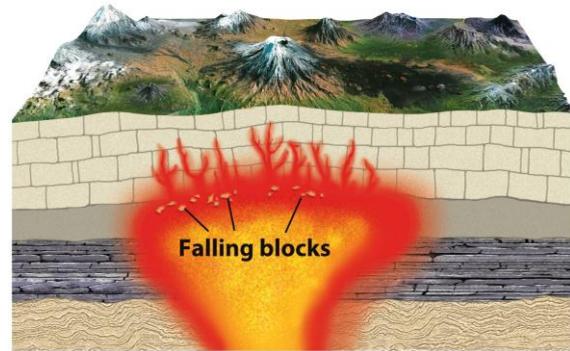
Regional Metamorphism = stress = foliation



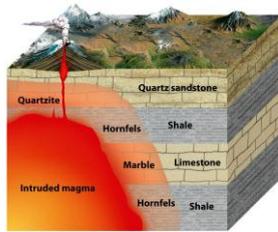
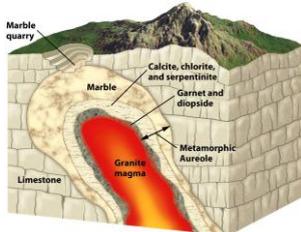
Types of Foliated Texture			
Slate	Phyllite	Schist	Gneiss
Fine grained, minerals not visible		Medium to coarse grained, minerals visible	
Clay minerals, chlorite, muscovite		Muscovite, biotite, garnet, kyanite, and others	Feldspars, quartz, muscovite, biotite, ferromagnesian minerals
Dense	Satiny luster	Shiny luster	Banded



Contact Metamorphism = thermal

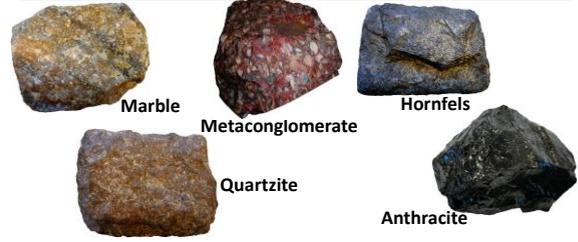


Limestone changed by contact metamorphism into marble and various types of minerals

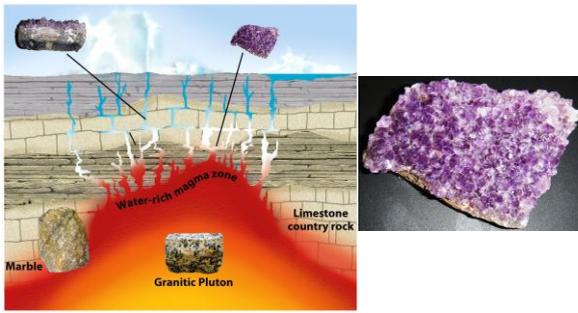


Contact metamorphism forms
Quartzite
Hornfels
Marble

Marble	Quartzite	Metaconglomerate	Hornfels	Anthracite Coal
Medium to coarse grained, minerals visible			Fine grained, minerals not visible	
Calcite (CaCO ₃)	Quartz (SiO ₂)	Anything conglomerate	Clay minerals, muscovite	Carbon-rich material
Hardness of 3; fizzes rapidly with dilute hydrochloric acid	Hardness of 7; breaks across grains	Breaks across grains and around them	Dense, dark colored	Black, shiny, conchoidal fracture



Nonfoliated rocks may develop during regional or contact metamorphism



In addition to heat and pressure, chemically active fluids transport heat and promote recrystallization

Identify where you would find metamorphic rocks and their type.

