Metamorphic Rocks

# METAMORPHIC ROCKS

## Rocks that form from other pre-existing rock (sedimentary, igneous, or metamorphic) that have been changed from high \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and/or high \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

## Conditions that cause rock to undergo metamorphism include:

### Heat - Under conditions of high temperature from \_\_\_\_\_\_\_\_\_\_\_\_ contacting pre-existing rock.

### Pressure - Deep burial and pressure from \_\_\_\_\_\_\_\_\_\_\_\_\_\_formation.

## Types of Metamorphism

### \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Metamorphism

### \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Metamorphism

## Contact Metamorphism

### Deep burial and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from mountain formation.

### The main metamorphic agent is \_\_\_\_\_\_\_\_\_\_\_.

### Also forms when pre-existing rock comes into contact with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or magma. The heat from the molten material is hot enough to cause the minerals in the original rock to re-crystallize, but not melt.

## Regional Metamorphism

### Covers large areas typically associated with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

### Deep burial and pressure from mountain formation.

### \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_ change the rock

# Types of Metamorphic Rocks

## \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: rocks with mineral crystals arranged in cable-like distorted layers/structures

### Mineral Alignment

### Banding

## \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: rocks with recrystallized minerals; no layering

### Recrystallization: This is the growth of new mineral crystals from other rocks.

## Foliated Textures

### Slately

1. looks like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. smooth, thin layering
3. breaks into \_\_\_\_\_\_\_\_\_\_\_ slabs
4. no \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ visible

### Phyllitic

1. looks like \_\_\_\_\_\_\_\_\_\_\_\_\_\_ surface
2. may have little "\_\_\_\_\_\_\_\_\_\_\_\_" on surface
3. some \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ visible

### Schistose

1. distinct \_\_\_\_\_\_\_\_\_\_\_ of minerals
2. \_\_\_\_\_\_\_\_\_\_\_\_\_ mineral grains
3. may have \_\_\_\_\_\_\_\_\_\_\_\_\_\_ appearance

### Gneissic

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ grains
2. may look like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ rock
3. may have crude banding
4. different \_\_\_\_\_\_\_\_\_\_\_\_\_\_ than Schistose

# Minnesota Metamorphic Rocks

## Morton Gneiss

### Some of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the world include the gneiss found in the Minnesota River Valley.

### Morton Gneiss is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ years old, is a coarsely crystalline, foliated

### Large \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = rock cooled \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ beneath the Earth’s surface.

### \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_= great heat and pressure

## Mica Schist

### \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, fine-grained sand and mud, were deformed by the same forces that caused the uplift of mountains in northern Minnesota.

### \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ formed from sediments, uplift, heat and pressure.

### Schist is composed predominantly of \_\_\_\_\_\_\_\_\_\_\_\_\_ minerals, which impart a platy or layered texture to the rock.

### Schist is common in central Minnesota and across northern Minnesota.

## Quartzite

### \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of reddish quartz sand grains were consolidated and slightly altered = quartzite.

### The reddish to purple \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is found at Blue Mound State Park and the Jeffers Petroglyphs in southwestern Minnesota.

### At the Pipestone National Monument, the soft, red pipestone the Indians favored for carving is a thin claystone layer between thick layers of quartzite.