



Topic/Objective CHAPTER: 6

NAME:

Pd: 1 2 4 5 other

DATE

1/23

Rocks

Essential Question

What are Metamorphic Rx

Cue: Review:
Thoughts: Main Idea

NOTE Taking AREA:

Meta Rx

Meta = form morph = Δ

Bread \rightarrow toast

\rightarrow Meta Rx form when igneous, sedimentary, ~~or~~ metamorphic rocks are changed usually by Heat, Pressure, &/or Chemical activity.

\rightarrow The heat that creates metamorphic Rx is NOT intense enough to cause melting, but it allows atoms in the rx to ~~re~~ Rearrange themselves in response to pressure changes, temperature changes, or chemical reactions

Formation
of Meta Rx
metamorphism

\rightarrow form when the composition of preexisting rock...

\rightarrow Protolith \rightarrow Country Rx

\rightarrow ... is changed by chemical activity, heat &/or pressure, but w/o melting.

Recrystallization

\rightarrow The heat, pressure, & hot fluids cause Atoms to rearrange to form NEW RX.

NOTES CONTINUE ON OTHER SIDE



Topic/Objective CHAPTER:

NAME:

DATE

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NOTE Taking AREA:

Classification

6 types of metamorphism

* 1) Contact

↳ is when thermal metamorphism (high temperature) @ constant pressure (low - moderate. Pressure) associated w/ igneous intrusions.

↳ Rocks are "Baked" into a ceramic from heat escaping from intrusive often enhanced by Hydrothermal fluids.

Batholith: mass of hardened magma under the ground.

Lacolith: mass of hardened magma under the ground near the surface that causes a hill to form

Igneous Intrusions

{ Dike: magma ^{Intrusion} that runs up & down
Sill: magma intrusion that runs side to side
↳ Ign Intrusions cause crystallization @ higher temp.

e.g.

Limestone → Marble

granite → Schists → Gneiss

Sandstone → Quartzite

SUMMARY:

Contact: occurs when rocks come into contact w/ molten rock.
: High Temp & moderate to low pressure



Topic/Objective CHAPTER: 6

NAME:

Pd: 1 2 4 5 other

DATE

20/3

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Classification of Meta Rx

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NOTE Taking AREA:

Metamorphism continues

2. Regional

*
↳ A.K.A. ⇒ Barrovian

Large Area
mt. building

↳ Affects large Volumes of Rx in areas where plates collide & produces Rx ~~changing~~ ranging from schist to gneiss.

→ Low to High Temp

HEAT

↳ This is DONE by HEAT &/or

PRESSURE

↳ PRESSURE which will Δ the

↳ intermediate ~~to~~ to High Pressure
↳ low grade pressure near the surface

molecular arrangement, and the chemical composition of the Protolith

Protolith

Regional
Metamorphic
Belts

↳ ARE divided into zones based upon mineral groups found in the Rx

The Depth & the Pressure from the weight of the overlying Rx which causes high temp & pressure affect a large region.



Topic/Objective CHAPTER:

NAME:

DATE

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NOTE Taking AREA:

3. Hydrothermal metamorphism

↳ Occurs when very HOT water reacts w/ rx and alters the mineralogy of the RX.

↳ This is NOT heat &/or Pressure, but HOT fluids migrating into & out of a RX which Δ the RX **Chemically**

↳ Occurs when HOT, chemically active mineral laden H_2O interacts w/ the surrounding pre existing RX (country RX)

2 different types

1) Igneous Fluids & Pegmatites:

↳ hydrothermal deposits of this type also produce many important mineral deposits, from SILVER & Gold to copper.

SUMMARY:

2) Oceanic Hydrothermal Metamorphism

↳ occurs at places where the oceanic rift centers (divergent plate boundaries) split apart.

↳ magma oozes out onto the ocean floor to form **Pillow Basalts** (Pillow lava).

↳ minerals leached out of the RX near **Black Smokers**



Topic/Objective CHAPTER: 6

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Rocks

Pd: 1 2 4 5 other

DATE

30/3

Essential Question

How to Identify Meta Rx

Cue: Review:
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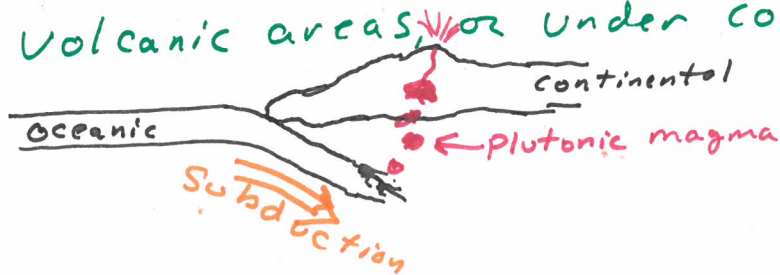
NOTE Taking AREA:

4. Cataclastic
or
fault Meta-
morphism

- ↳ Occurs along faults & fractures in the Earth's crust.
- ↳ involves crushing & deformation of Minerals!
- ↳ Produce rocks called: Mylonite
Caused by the rocks that are broken & distorted as faults grind past 1 another e.g. during earthquake.

5. High Pressure
metamorphism

- ↳ A.K.A. Blue Schist Metamorphism
- ↳ Low temp & high Pressure
- ↳ Occurs @ Convergent plate boundaries in subduction zones, either under volcanic areas, or under continents



6. Eclogite
metamorphism

- ↳ takes place in the mantle where there is moderate Temp & Very high Pressure
- ↳ Protolith is ULTRAMAFIC (peridotite).

NOTES CONTINUE ON OTHER SIDE



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NAME:

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NOTE Taking AREA:

Characteristics of Meta Rx

- ↳ often identify Meta Rx by banding, distortion, or resemblance to other rock types.
- ↳ generally resemble their parent Rx & sometimes have the same chemical composition, but they may show increased distortion

Protolith

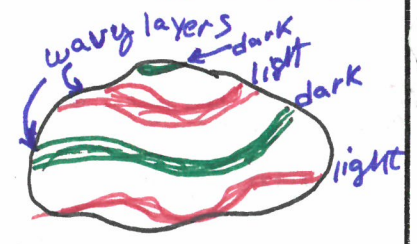
Country Rx

Classifying of Meta Rx

↳ can be classified by their TEXTURE and How they formed.

Foliated

↳ have visible bands of crystals that may be arranged in different ways



e.g.

Slate Phyllite Schist Gneiss
mineral Alignment (Banded)

↳ long axes of their minerals are perpendicular (⊥) to the pressure that altered them.

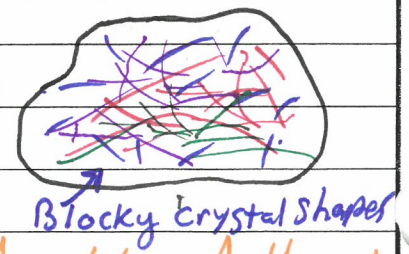
NonFoliated

↳ exhibit some amount of distortion (stretching or scrunching) of their crystals or fragments

SUMMARY:

Recrystallization

called: Recrystallization, but do not show layering.



e.g. Hornfels Quartzite Marble Anthracite coal

↳ Lack of mineral grains w/ long axes oriented in 1 direction.