Igneous Rocks

How do we classify igneous rocks?

Phenomenon: Igneous Rocks

Igneous Rocks

- Igneous Rocks - rock type that forms when molten material solidifies
    - Methods to classify igneous rocks:

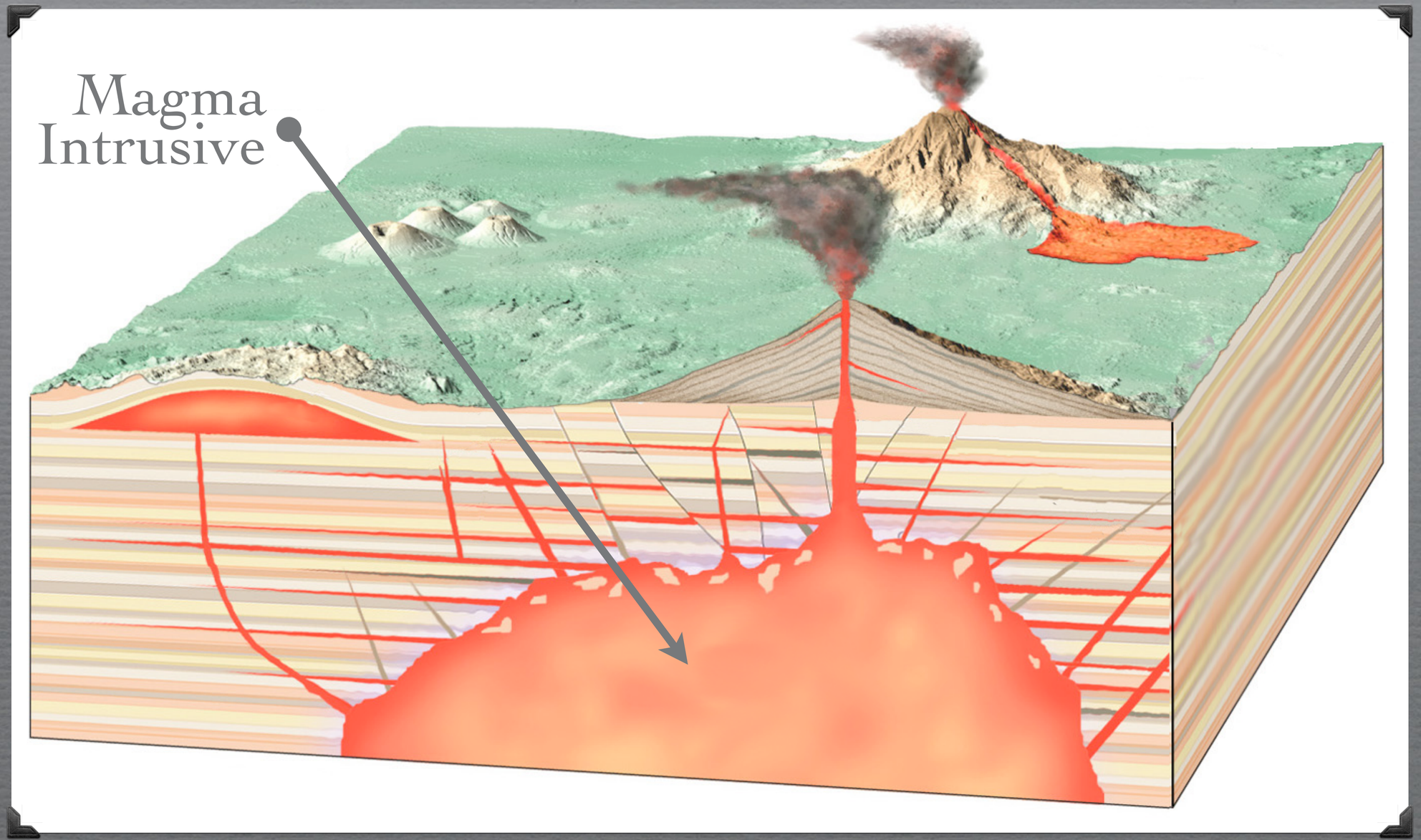
Igneous Rocks

1. Environment of Formation - the location where liquid rock solidifies into solid rock

"Liquid Hot Magma"

Igneous Rocks

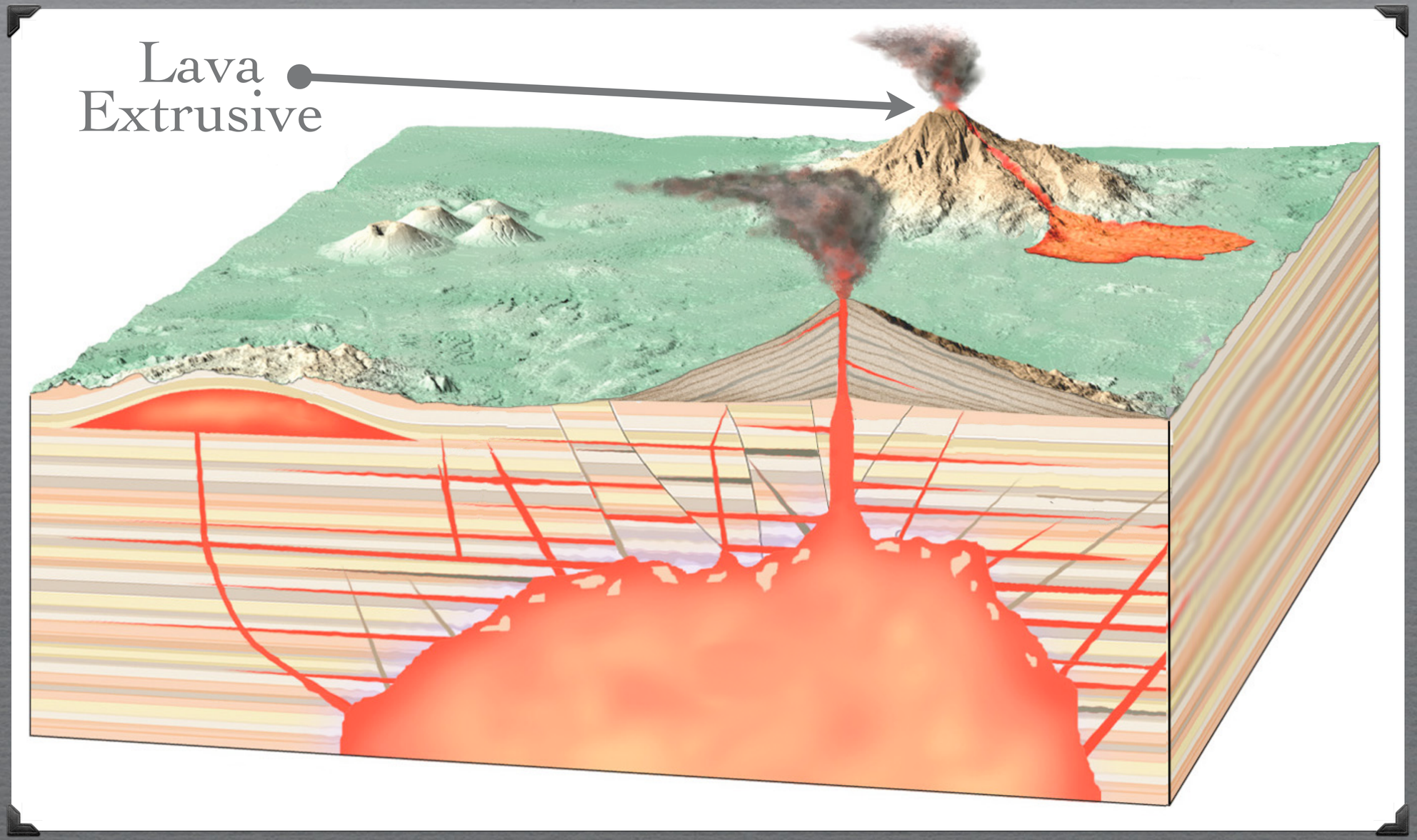
- Magma - molten rock that is inside of the Earth
- Plutonic - rock that formed deep within the Earth
- Intrusive - below Earth's crust



Environment of Formation

Igneous Rocks

- Lava - molten rock that is outside of the Earth
- Volcanic - rock that formed above Earth's surface
- Extrusive - above Earth's crust



Environment of Formation

Igneous Rocks

2. Crystal Size - refers to an actual measurement of the individual crystals or aggregate

Obsidian

Granite

Igneous Rocks

- Crystal size is an important factor to determine the environment of formation
  - The longer the cooling time the larger the crystal size [coarse or very coarse]
  - The shorter the cooling time the smaller the crystal size [glassy or fine]

Igneous Rocks

Remember:

THE LONGER THE COOL THE BIGGER THE JEWEL

Igneous Rocks

Long Cooling [Coarse]

Short Cooling [Fine]

Igneous Rocks

3. Texture - the appearance or character of a rock
    - Vesicular - texture that consists of gas pockets that give the appearance of having holes
    - Porphyritic - texture that contains large crystals in a fine grained matrix

Igneous Rocks

Vesicular

Porphyritic

Igneous Rocks

4. Color - the shade of the rock based on its composition
    - Either: light or dark

Igneous Rocks

Dark

Light

Igneous Rocks

5. <u>Density</u> - the ratio of mass to volume of the rock based on its composition
    - Either: lower or higher

Igneous Rocks

6. Composition - a mixture of materials found in the rock
    - Either: felsic or mafic

Igneous Rocks

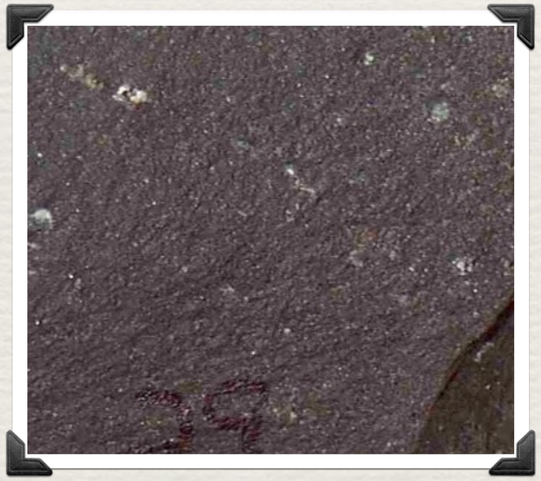
- Felsic - light colored rocks that have a high aluminum [Al] content and silicon [Si]

Granite

Rhyolite

Igneous Rocks

- Mafic - dark colored rocks that have a high iron [Fe] or magnesium [Mg] content

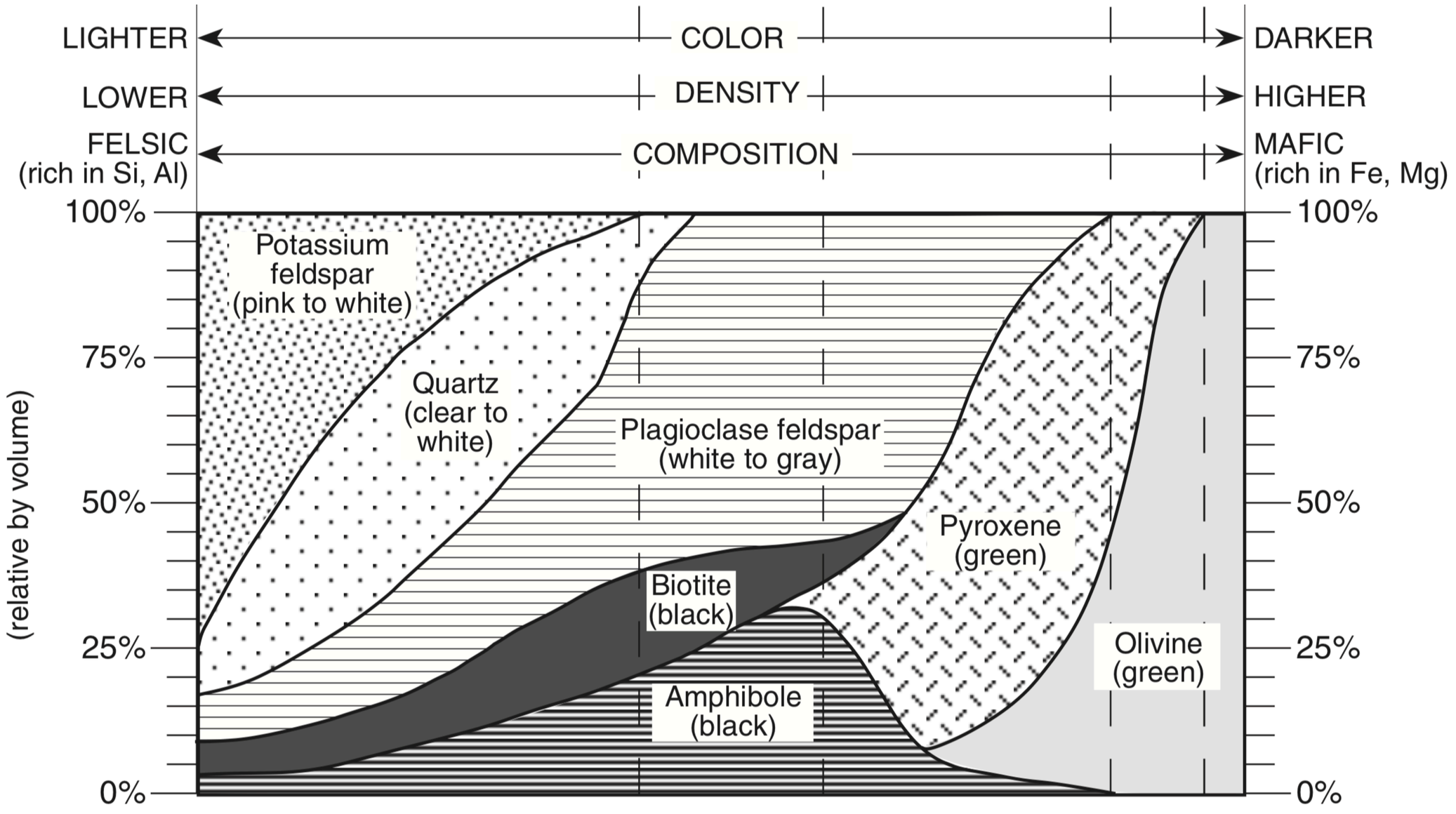


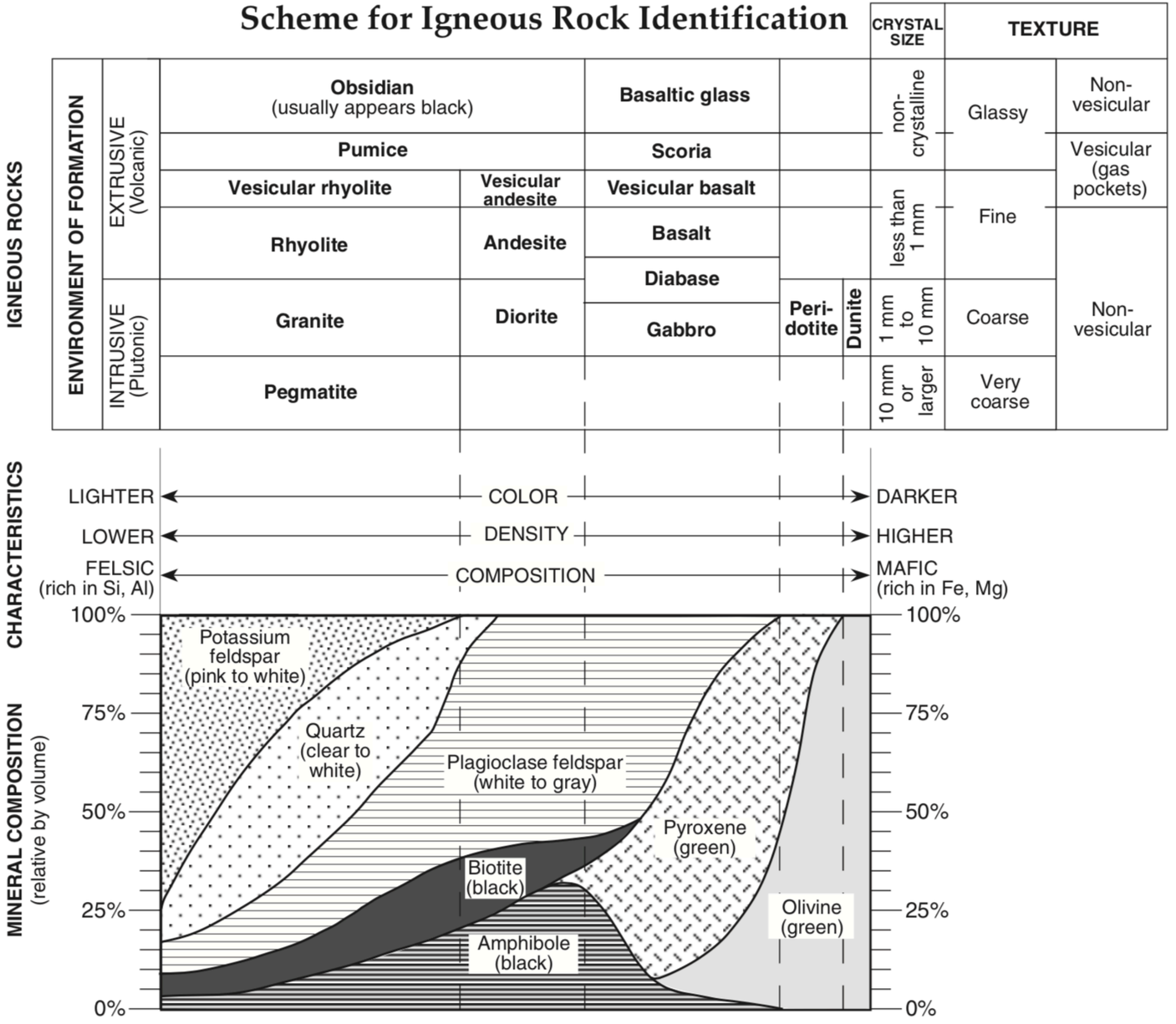
Basalt

Scoria

Igneous Rocks

7. Mineral Composition - the minerals and approximate percentages found in the rock


LIGHTER
COLOR
DARKER
LOWER
DENSITY
HIGHER
FELSIC
(rich in Si, Al)
COMPOSITION
MAFIC
(rich in Fe, Mg)
100%
75%
50%
25%
0%
(relative by volume)
Potassium feldspar (pink to white)
Quartz (clear to white)
Plagioclase feldspar (white to gray)
Biotite (black)
Amphibole (black)
Pyroxene (green)
Olivine (green)


Scheme for Igneous Rock Identification
IGNEOUS ROCKS
ENVIRONMENT OF FORMATION
EXTRUSIVE (Volcanic)
INTRUSIVE (Plutonic)
Obsidian (usually appears black)
Basaltic glass
Pumice
Scoria
Vesicular rhyolite
Vesicular andesite
Vesicular basalt
Rhyolite
Andesite
Basalt
Diabase
Granite
Diorite
Gabbro
Peri-dotite
Dunite
Pegmatite
CRYSTAL SIZE
TEXTURE
non-crystalline
Glassy
Non-vesicular
Vesicular (gas pockets)
less than 1 mm
Fine
1 mm to 10 mm
Coarse
Non-vesicular
10 mm or larger
Very coarse
CHARACTERISTICS
LIGHTER
COLOR
DARKER
LOWER
DENSITY
HIGHER
FELSIC (rich in Si, Al)
COMPOSITION
MAFIC (rich in Fe, Mg)
MINERAL COMPOSITION (relative by volume)
100%
75%
50%
25%
0%
Potassium feldspar (pink to white)
Quartz (clear to white)
Plagioclase feldspar (white to gray)
Pyroxene (green)
Biotite (black)
Olivine (green)
Amphibole (black)

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