Igneous Rocks

How do we classify igneous rocks?
Igneous Rocks

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

- Environment of Formation - the location where liquid rock solidifies into solid rock
“Liquid Hot Magma”
Igneous Rocks

**Environment of Formation**

- **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

Magma Intrusive
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Environment of Formation

- **Lava** - molten rock that is outside of the Earth
- **Volcanic** - rock that formed on the Earth’s surface
- **Extrusive** - above Earth’s crust
Environment of Formation

Lava
Extrusive
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**Color**

- **Color** - for igneous rocks color is broken into two categories of light or dark

[Images of dark and light rocks]
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**Composition**

- **Composition** - a mixture of materials that make up an igneous rock
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Composition

- **Felsic** - light colored rocks that have a high aluminum (Al) content and silicon (Si)

![Granite](image1)

![Rhyolite](image2)
Igneous Rocks

Composition

- **Mafic** - dark colored rocks that have a high iron (Fe) or magnesium (Mg) content
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**Texture**

- **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
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Vesicular

Porphyritic
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Crystal Size

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

![Obsidian](image1.png)  ![Granite](image2.png)

Obsidian  Granite
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Crystal Size

- 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)
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Coarse Texture
Long Cooling

Fine Texture
Short Cooling
Scheme for Igneous Rock Identification

<table>
<thead>
<tr>
<th>ENVIRONMENT OF FORMATION</th>
<th>IGNEOUS ROCKS</th>
<th>CRYSTAL SIZE</th>
<th>TEXTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTRUSIVE (Effusive)</td>
<td>Obsidian (usually appears black)</td>
<td></td>
<td>Glassy</td>
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<tr>
<td></td>
<td>Pumice</td>
<td></td>
<td>Non-vesicular</td>
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<tr>
<td></td>
<td>Vesicular rhyolite</td>
<td>Vesicular</td>
<td>Vesicular (gas pockets)</td>
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<td></td>
<td>Vesicular andesite</td>
<td>andesite</td>
<td>Fine</td>
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<td></td>
<td>Rhyolite</td>
<td>Basalt</td>
<td>Coarse</td>
</tr>
<tr>
<td></td>
<td>Granite</td>
<td>Diabase</td>
<td>Non-vesicular</td>
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<tr>
<td></td>
<td>Pegmatite</td>
<td>Peridotite</td>
<td>Very coarse</td>
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</tbody>
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CHARACTERISTICS

- LIGHTER
- LOWER
- FELIC (rich in Si, Al)
- DARKER
- HIGHER
- MAFIC (rich in Fe, Mg)

MINERAL COMPOSITION (relative by volume)

- Potassium feldspar (pink to white)
- Quartz (clear to white)
- Plagioclase feldspar (white to gray)
- Biotite (black)
- Amphibole (black)
- Olivine (green)

COMPOSITION

- Composition}

Earth Science Reference Tables
Igneous Rocks