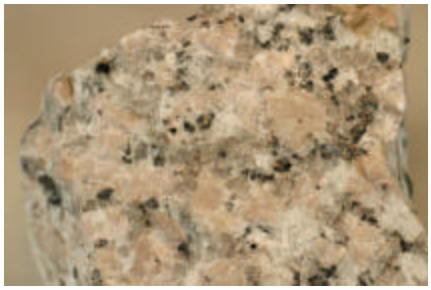
The Classification of Igneous Rocks

Based on-

- **Texture**- which is a function of where the molten material (magma/lava) cooled. So this is based on whether or not rock is intrusive or extrusive.
- **Chemical composition-** based on the amounts of silica and iron/magnesium that are present in the minerals that make up the rock.

Please note that two different rock types can form from the same molten material. One rock name is given to the rock that forms from molten material that cools rapidly at Earth's surface. A different rock name is given to the rock that forms from the same molten material but does not reach Earth's surface and cools within Earth. See the next slide

Granite- coarse-grained
Cooled slowly, inside the Earth. Intrusive



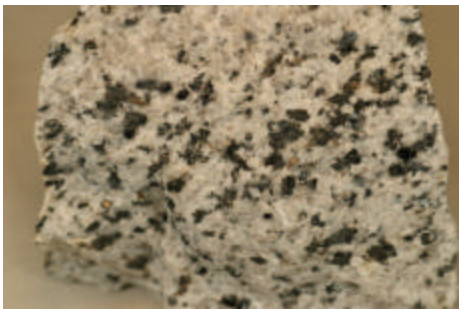
Rhyolite- fine-grained
Cooled quickly, on Earth's surface. Extrusive

Both rocks began from the same magma, which was rich in silica and low in iron and magnesium. The difference is in where the molten material cooled and solidified. This impacts the rate of cooling and the amount of time the individual mineral grains have to grow.

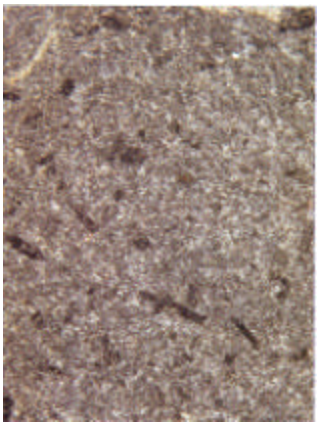
Classification for seven igneous rocks

Intrusive (from magma inside the Earth)	***Granite***			
Extrusive (from lava extruded to surface of Earth)	Rhyolite			
Variation in chemical composition	Hi silica, low iron and magnesium			
Variation in color	Light color			
Variation in density	Low			

Diorite - a coarse-grained rock that cooled slowly inside the Earth. Intrusive



Andesite - a fine-grained rock that Cooled quickly on Earth's surface. This is a close-up view. Extrusive

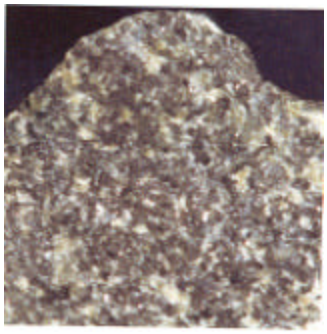


Both rocks began from the same magma, which had more iron and magnesium and less silica than the magma that formed granite and rhyolite. The difference in texture is cause by where the molten material cooled and solidified.

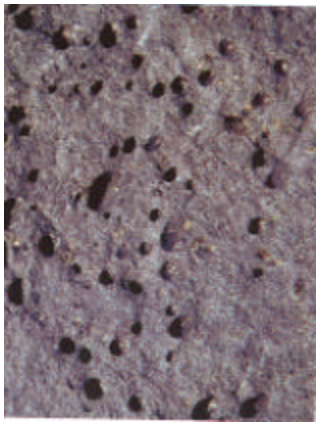
Classification for seven igneous rocks

Intrusive (from magma inside the Earth)	Granite	Diorite		
Extrusive (from lava extruded to surface of Earth)	Rhyolite	Andesite		
Variation in chemical composition	Hi silica Low iron and magnesium	Intermediate Amounts of Silica, iron, magnesium		
color	light color	Intermediate gray color		
density	Low	Intermediate		

Gabbro- a coarse-grained rock that Cooled slowly inside the Earth. Intrusive



Basalt- a fine-grained rock that cooled quickly on the surface of the Earth. This one has gas bubble holes. Extrusive

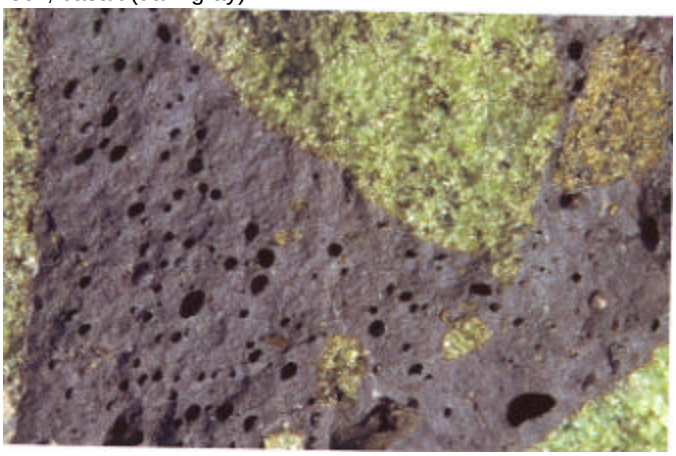


Both rocks began from the same magma, which was richer in iron and Magnesium and lower in silica than the previous rock types.

Classification for seven igneous rocks

Intrusive (from magma inside the Earth)	Granite	Diorite	Gabbro	
Extrusive (from lava extruded to surface of Earth)	Rhyolite	Andesite	Basalt	
Variation in chemical composition	Hi silica Low iron and magnesium	Intermediate Amounts of Silica, iron, magnesium	Hi iron and magnesium, lower silica	
color	light color	Intermediate gray color	Dark gray	
density	Low	Intermediate	Hi	

Peridotite - a coarse-grained rock that cooled slowly inside the Earth. Peridotite is the green rock. Here it occurs as pieces caught up in another rock, basalt (dark gray).

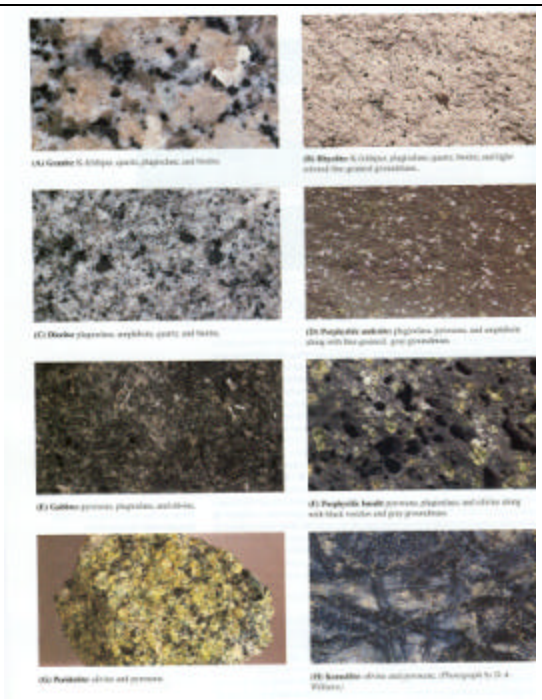


Peridotite is extremely rich in iron and magnesium and very poor in silicon and oxygen (silica).

Classification for seven igneous rocks

Intrusive (from magma inside the Earth)	Granite	Diorite	Gabbro	Peridotite
Extrusive (from lava extruded to surface of Earth)	Rhyolite	Andesite	Basalt	
Variation in chemical composition	Hi silica Low iron and magnesium	Intermediate Amounts of Silica, iron, magnesium	Hi iron and magnesium, lower silica	Very hi iron and magnesium. Very low silica
color	light color	Intermediate gray color	Dark gray	Dark, but sometimes green
density	Low	Intermediate	Hi	Very high

- There is no extrusive equivalent rock to peridotite that forms today. Magmas of this chemistry do not make it to Earth's surface.
- Know the complete chart for future assessment.



All the igneous rocks for this course. Each pair of rocks formed from the same magma. From top to bottom the rocks become richer in iron and Magnesium and poorer in silicon and oxygen.

The top four rocks are rocks of the continental crust. The gabbro and basalt are rocks of the ocean floor. Peridotite is the rock of the upper mantle.

The 8th rock, (bottom right) is no One to learn for this course.

Fig. 4.5 pg. 90 of your book