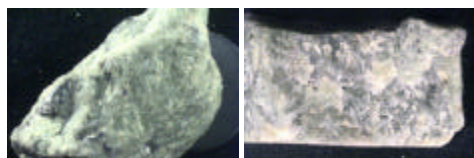


# BOWEN'S REACTION SERIES

## AND THE IGNEOUS ROCK FORMING MINERALS

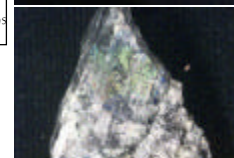


**Ferro-Magnesium (Mafic) Minerals**

Olivine isolated  $\text{SiO}_4$   
 light green, glassy, often as small grains

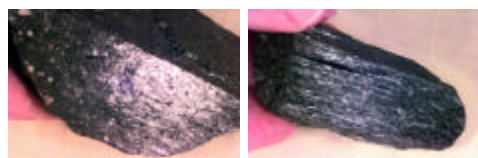
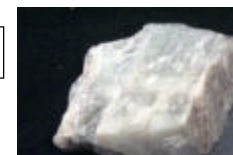
**Non-Ferro-Magnesium (Feldspar) Minerals**

Ca Plagioclase  
 dark, almost black to light gray; 90° cleavage; striations and/or iridescence



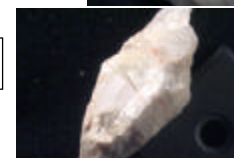
Pyroxene single chain  
 dark green/black; dull blocky; 90° cleavage

Ca/Na Framework silicates  
 white; 90° cleavage; striations sometimes; appears translucent



Amphibole double chain  
 black, shiny, elongate, crystals; 60-120° cleavage

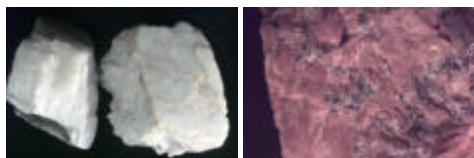
Na Plagioclase  
 white; 90° cleavage; striations sometimes; appears translucent



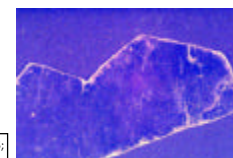
Biotite sheet  
 black, very shiny, in thin very smooth sheets

Orthoclase

pink, white, greenish; two cleavages 90°; opaque



Muscovite  
 white to brassy thin sheets; clear; very smooth



Quartz  
 glassy, clear, often appears gray in rocks; no cleavage

