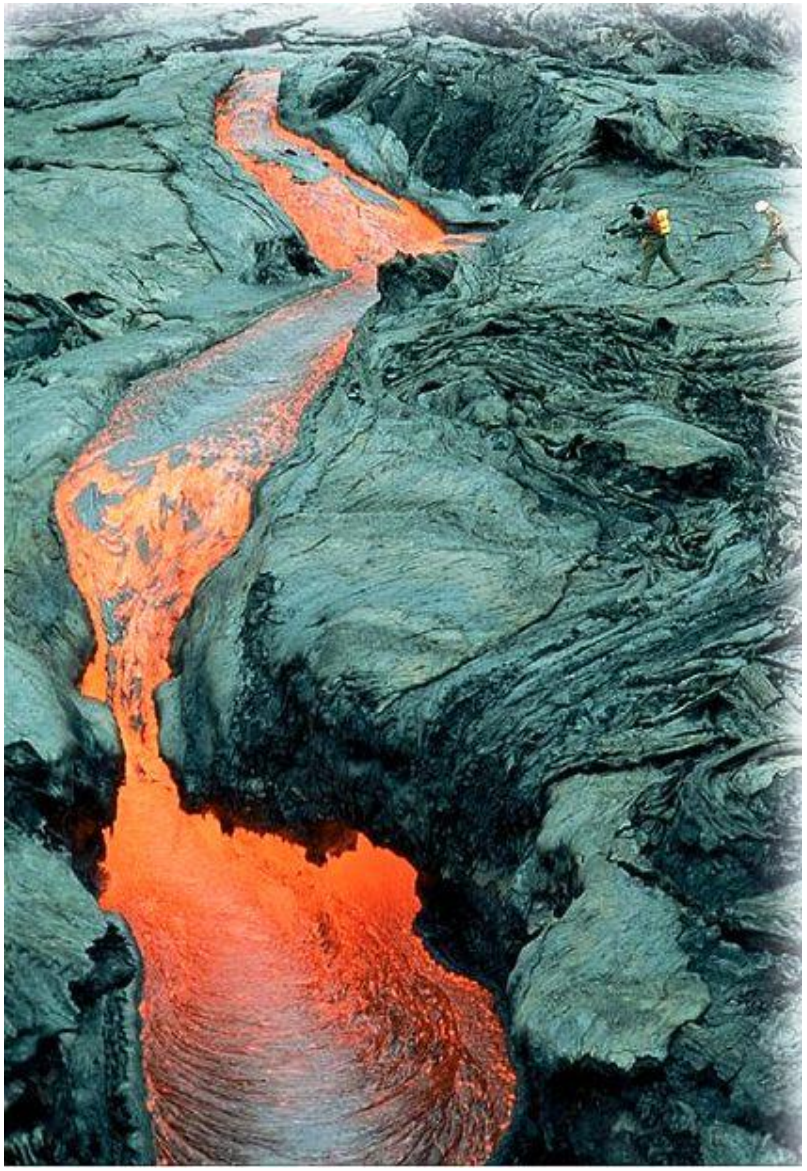
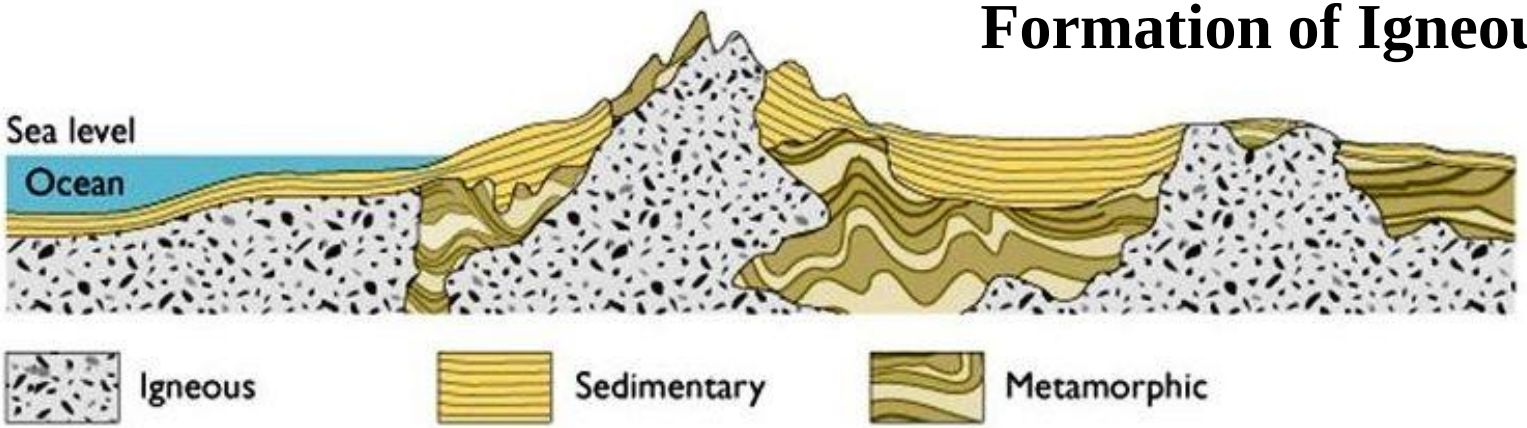
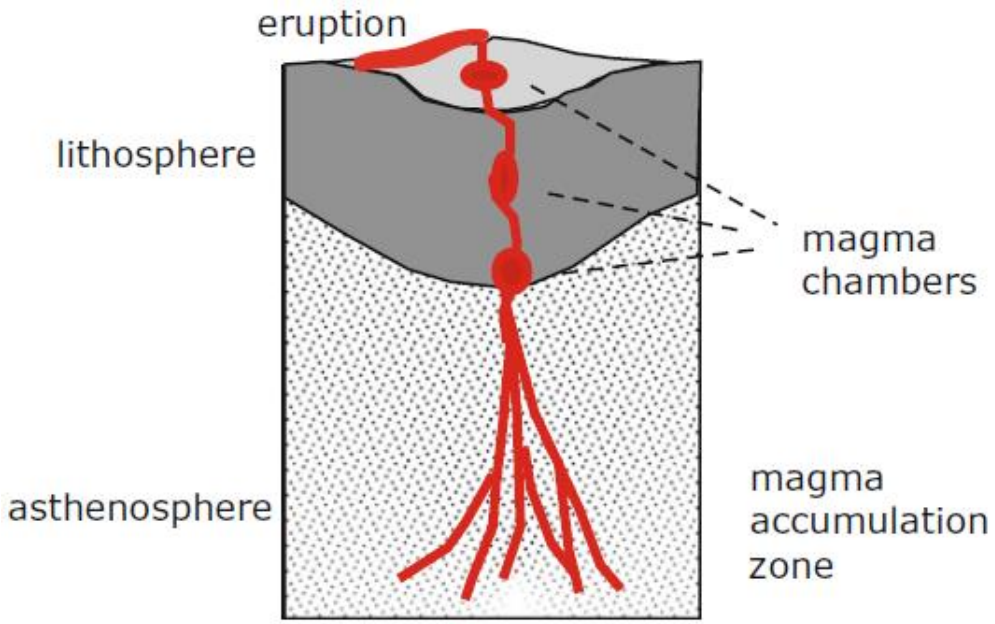
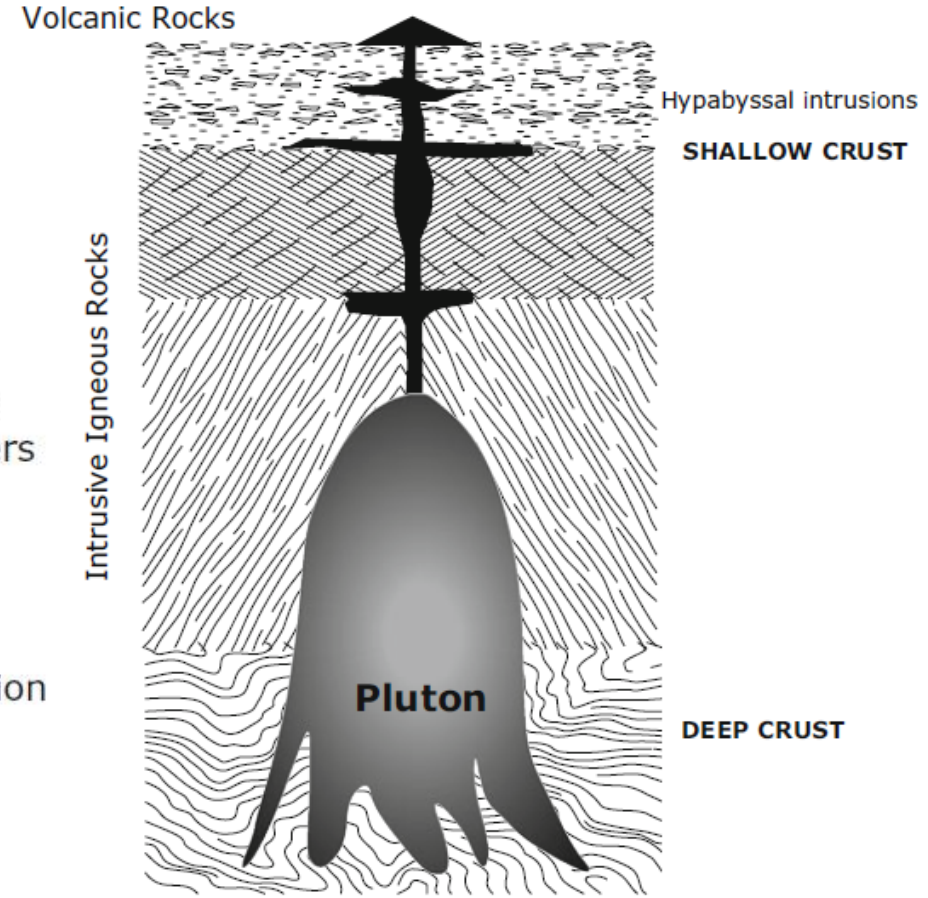
Igneous Petrology



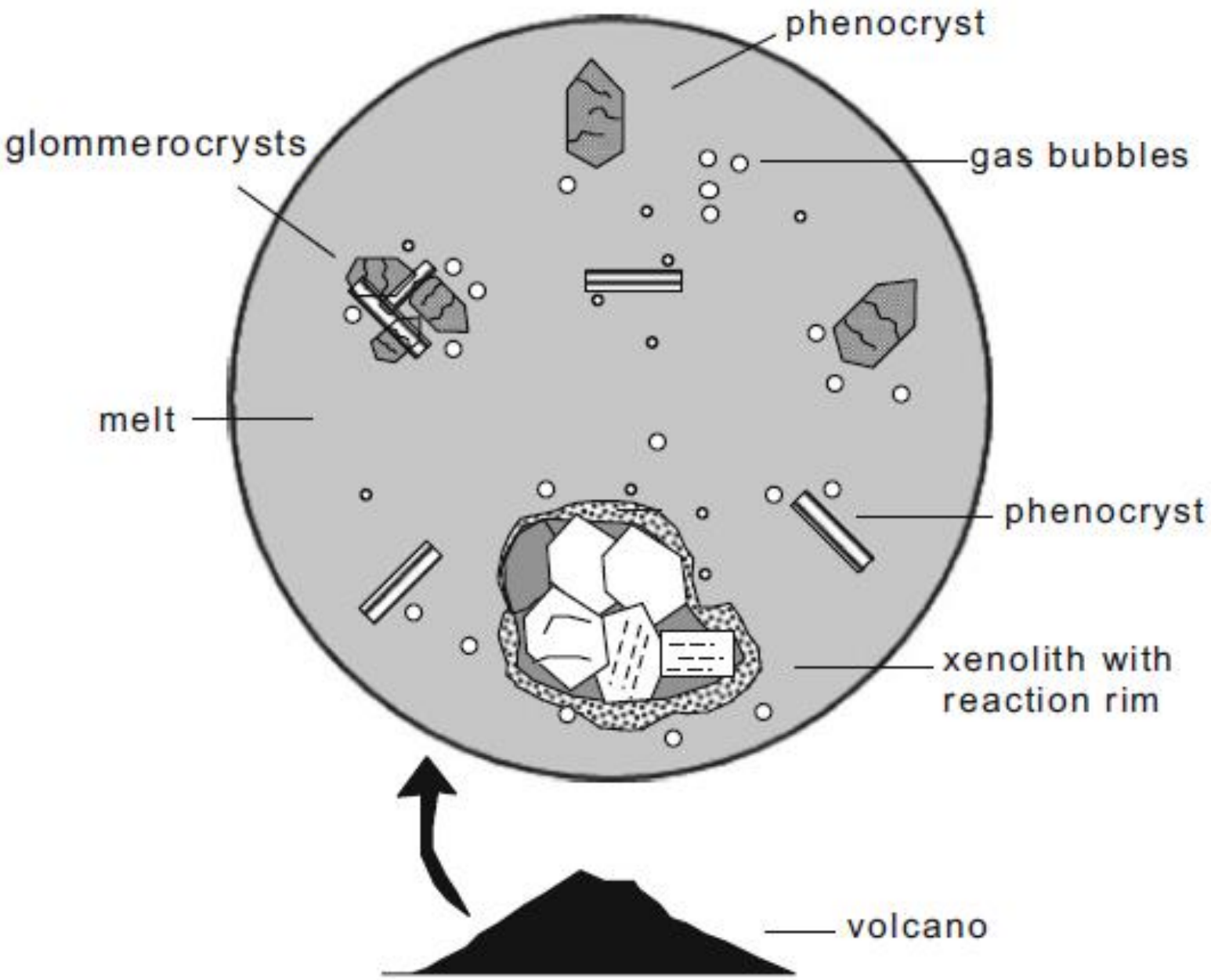
Formation of Igneous Rocks

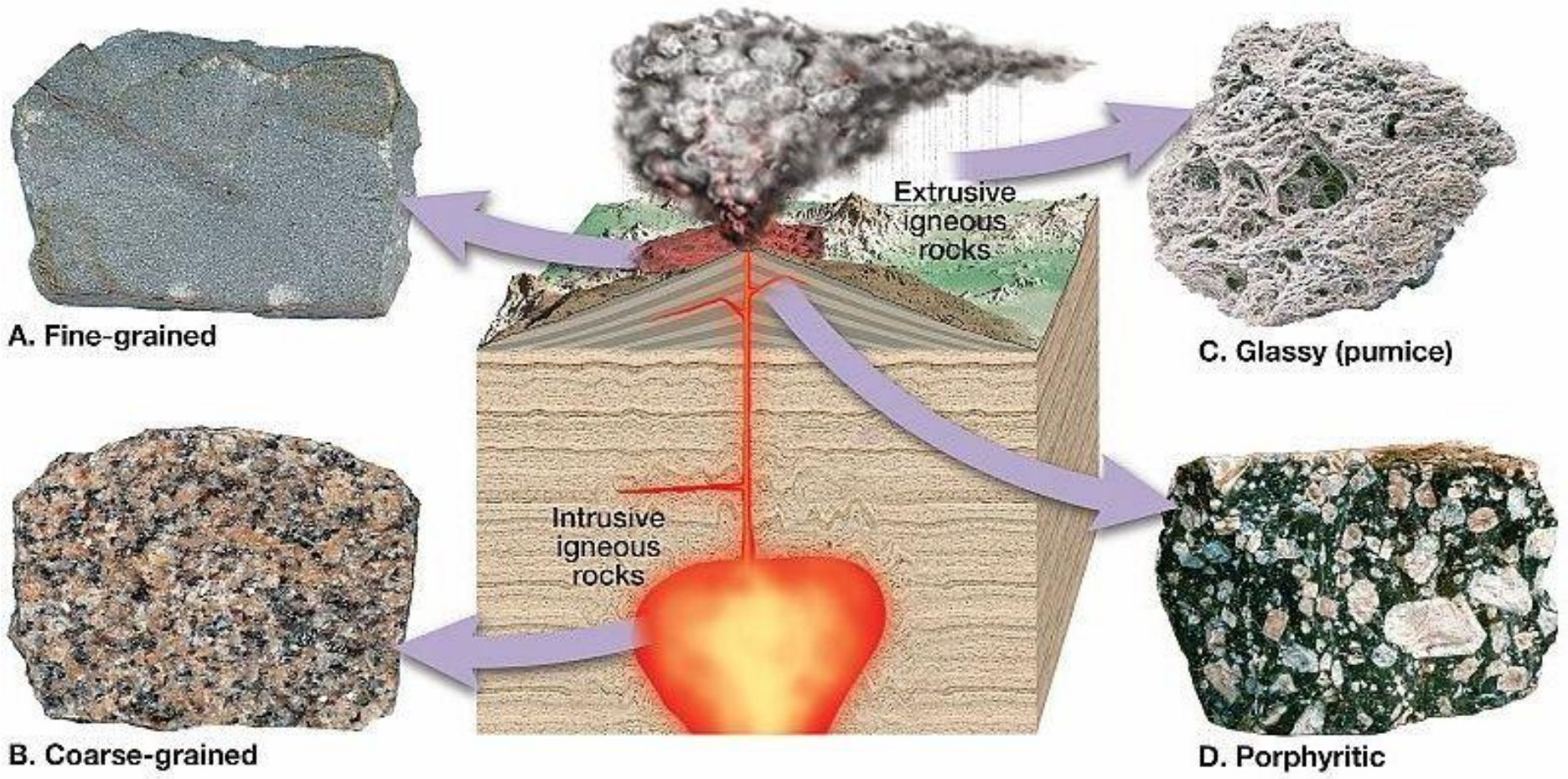


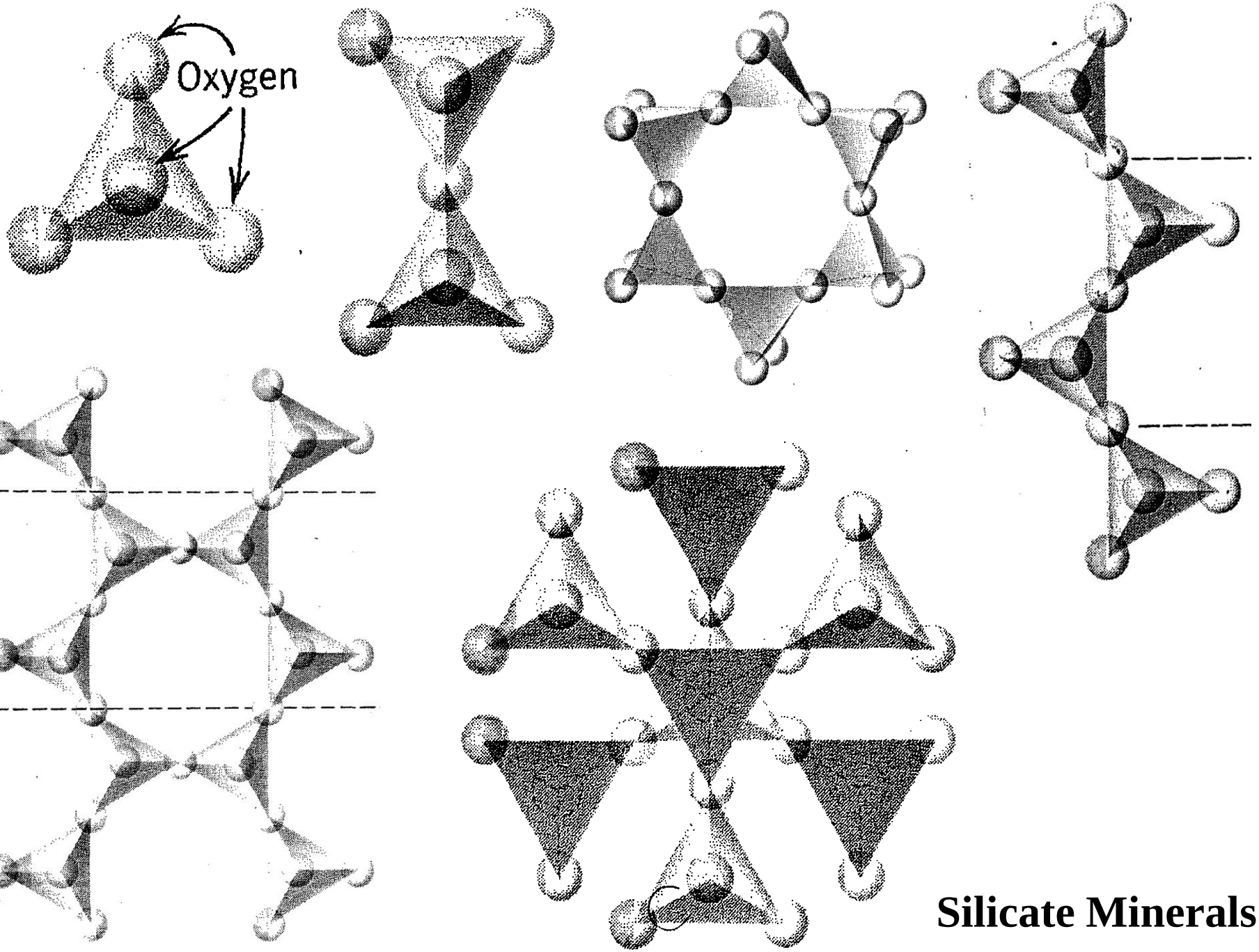




Components of Magma



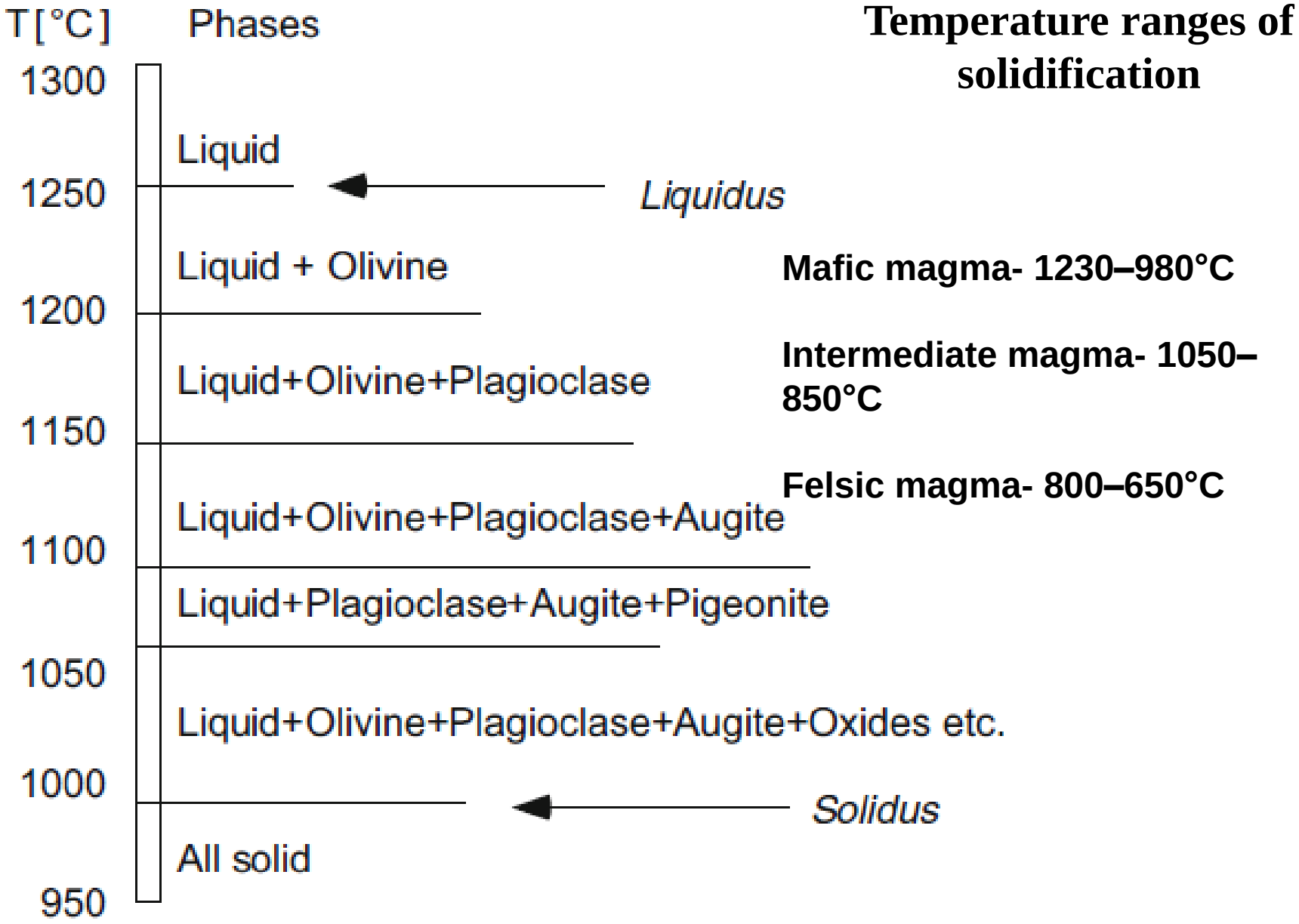

Extrusive igneous rocks
Intrusive igneous rocks
A. Fine-grained
B. Coarse-grained
C. Glassy (pumice)
D. Porphyritic



Silicate Minerals

Magma type	Ultramafic	Mafic
SiO_2	42–48	46–54
$MgO + FeO + MnO + Fe_2O_3$	35–46	15–28
$Na_2O + K_2O$	<1	2–3.5
Majo minerals	Olivine (generally dominant) + pyroxenes	Plagioclase + pyroxene
Volcanic	Komatiite	Basalt
Hypabyssal	Komatiite	Diabase
Plutonic	Peridotite	Gabbro

Magma type	Intermediate	Felsic
SiO_2	60–65	>70
$MgO + FeO + MnO + Fe_2O_3$	10–21	<3
$Na_2O + K_2O$	3–6	5–10
Majo minerals	Pyroxene + plagioclase + amphibole	Alkali feldspar + quartz
Volcanic	Andesite	Rhyolite
Hypabyssal		
Plutonic	Diorite	Granite

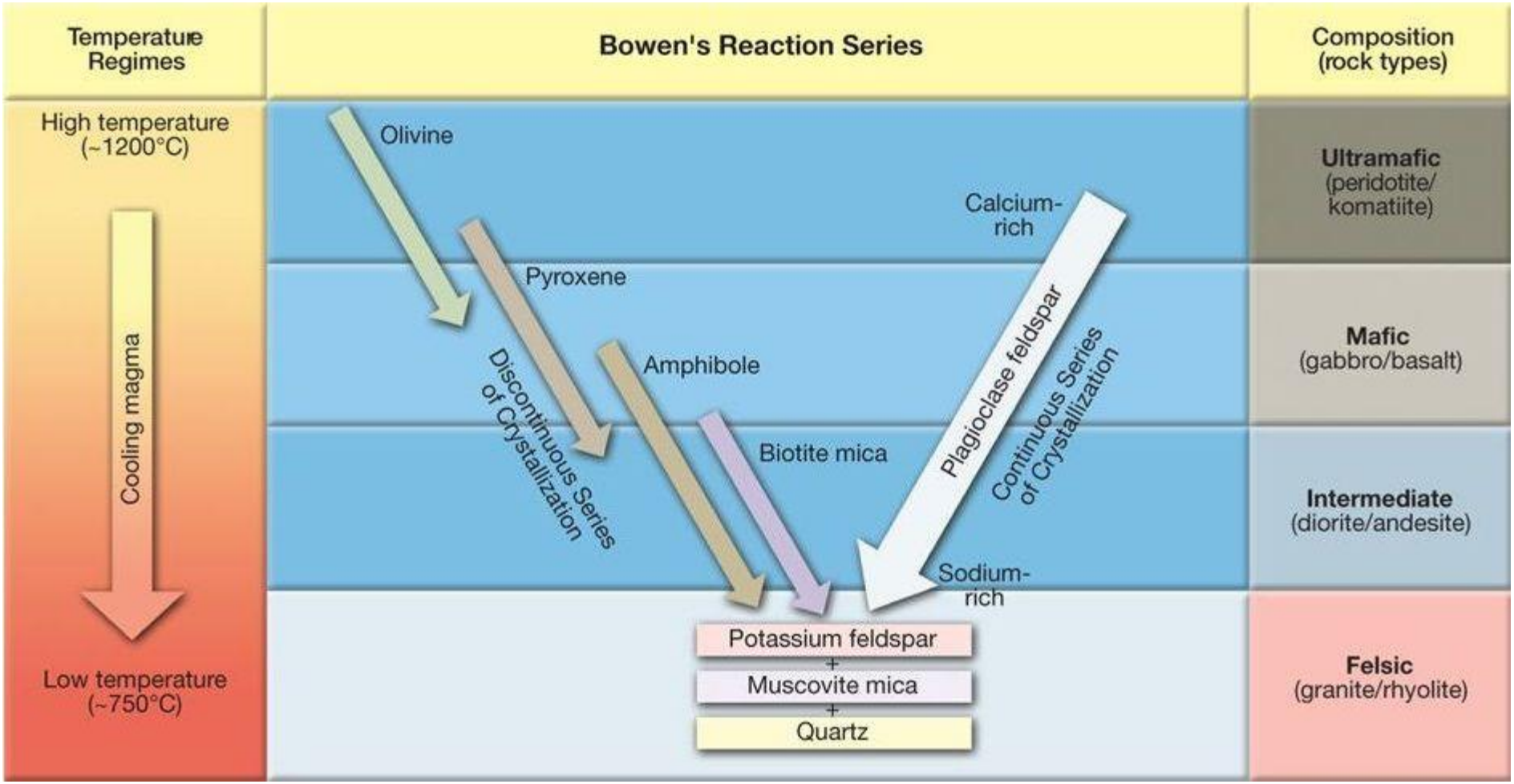


Temperature ranges of solidification

Mafic magma- 1230–980°C

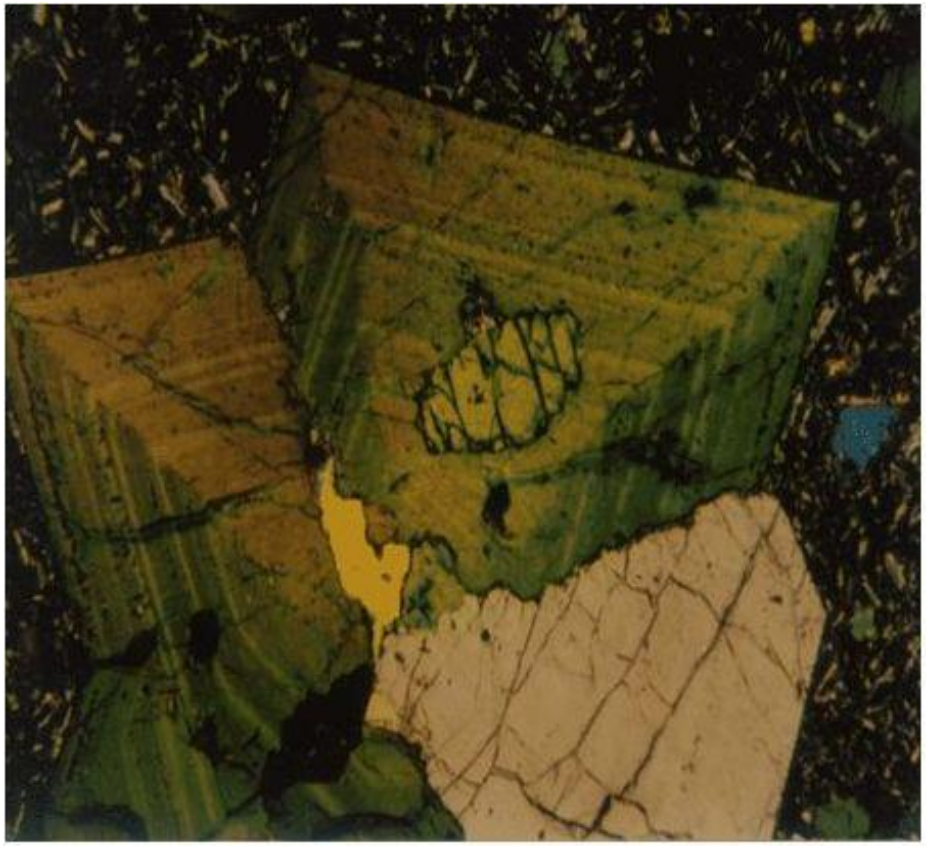
Intermediate magma- 1050–850°C

Felsic magma- 800–650°C

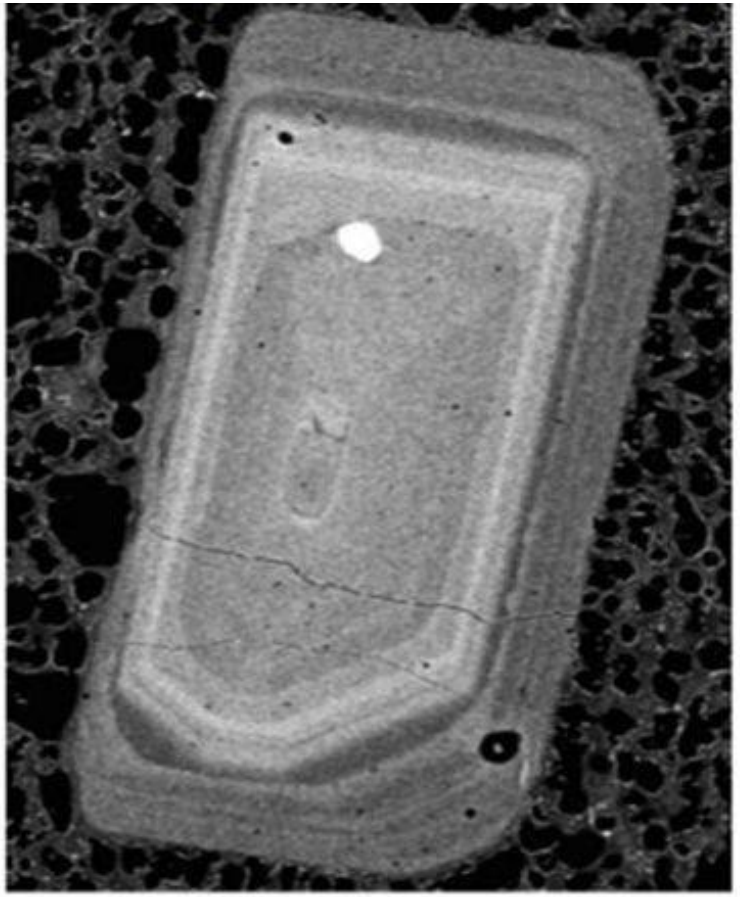


The Phenomenon of Fractional Crystallization

Bowen's Reaction in action



An olivine crystal surrounded by pyroxene in an extrusive (volcanic) igneous rock.



A zoned crystal of plagioclase in an igneous rock. The center (core) is Ca-rich and the edge (rim) is Na-rich.

Structures of Igneous Rocks- Plutonic Bodies