GEO 306/546 – Min-Pet I **Rock Classification Scheme**

There are many different types of igneous rocks found throughout the world. They are classified according to two major features: texture and composition. Texture refers to the size of the grains in the rocks, as well as their orientation, and composition refers to the mineral phases found within the rocks. You may find the following definitions useful in your Petrology studies:

Felsic – Acidic; High in Silica (>66 wt. % SiO_2)

Intermediate – Moderate amount of Silica (52-66 wt. % SiO_2)

Mafic – Basic; Low in Silica (45-52 wt. % SiO_2)

Ultramafic – Extremely low in Silica, High in Ferromagnesian Minerals (<45 wt. % SiO_2)

Phaneritic – Coarse Grained

Aphanitic – Fine Grained

Vesiculated – Rapid depressurizing and cooling of liquid leads to escaping air bubbles which form vesicles in the rocks.

Classification of igneous rocks relies heavily on your ability to identify the minerals found in the rock. Minerals essential to naming the rock in question fall into two classes: 1) Those that form the specific name of the rock (e.g. Quartz, Plag and K-Spar in a granite) and 2) those that are important enough to indicate the variety of that rock (e.g. Hornblende in a Hornblende Granite). These varietal minerals are used as modifiers of the specific name, the least abundant being listed first. Other less abundant minerals formed by primary crystallization are called accessory minerals, while minerals formed by later alteration are called secondary minerals.

The following list breaks down each rock type based on its constituent minerals. This does not take into account any varietal minerals that may be in the rock. Be sure to take special note of those when naming the rocks you encounter! NOTE: The list below contains only plutonic rocks, meaning the coarse grained equivalents. For the fine grained versions, consult the texture classification table later in this handout.

Peridotite Family – Ultramafic rocks consisting mainly of olivine

a) Dunite – Olivine, minor Enstatite, minor Chromium Spinel

b) Harzburgite – Olivine, Enstatite, minor Chromium Spinel

c) Lherzolite – Olivine, Enstatite, Diopside, minor Chromium Spinel or Pyrope

Gabbro Family – Plutonic equivalents of Basalts

a) Gabbro – Plagioclase, Augite, rarely Hornblende or Quartz

b) Olivine Gabbro – Plagioclase, Augite, Olivine, minor Enstatite

c) Norite – Plagioclase and Enstatite, but rarely Biotite or Quartz

d) Olivine Norite – Plagioclase, Olivine, Enstatite

e) Anorthosite – 90% or more Plagioclase, minor ferromagnesian minerals

f) Pyroxenite – Enstatite, Augite, or both, other mafic minerals rare

g) Troctolite – Calcic Plagioclase and Olivine

Diorite Family – Plutonic equivalents of Andesites

a) Diorite – Plagioclase, Hornblende, Pyroxene

b) Ferrodiorite – Plagioclase, Hornblende, Augite, minor Enstatite and Fayalite

c) Quartz Diorite – Plagioclase, Hornblende, Biotite, Quartz

Granite Family – Plutonic equivalents of Rhyolites

a) Granodiorite – Plagioclase, subordinate K-Spar, Biotite and/or Hornblende

b) Quartz Monzonite – K-Spar, Plagioclase, Biotite and/or Hornblende

c) Granite – K-Spar dominant, Plagioclase, Quartz, sometimes Biotite, Hornblende, and/or Muscovite

d) Alkali Granite – Granite with small amounts of Aegirine or Na-Amphibole

Syenite Family – Plutonic Equivalents of Trachytes

a) Syenite – Silica Saturated, K-Spar dominant, Plagioclase, one or more mafic mineral (Hornblende, Biotite, or Augite)

b) Monzonite – Subequal amounts of K-Spar and Plagioclase, sometime Feldspathoids

c) Nepheline Syenites – Undersaturated Feldspathoidal group minerals (e.g. Nepheline, Sodalite, Analcime), K-Spar, Alkali Mafic Minerals (Biotite, Alkali Hornblende, Aegirine

Knowing a rock's composition without knowing its texture does not allow you to accurately name the rock, and vice versa. A rock of a given composition could be classified into several different groups depending on its texture. The table below shows a general example of how rocks are classified based on their textures and compositions.

Texture	**Felsic**		**Intermediate**	**Mafic**	**Ultramafic**
Phaneritic (Coarse Grained)	Syenite	Granite	Diorite	Gabbro	Dunite
Aphanitic (Fine Grained)	Trachyte	Rhyolite	Andesite	Basalt	Peridotite
Glass Smooth	Obsidian				
Glass Vesiculated	Pumice		Scoria		