Benha university
Faculty of science
Geology Dept.
14 / 1 /2017

Third Level
Geology
Igneous Petrology (333G)
Time: Two Hours

نموذج إجابة

Examination of Igneous petrology (333G) for the third level students (Geology), Jan. 2017.

Igneous Petrology

Answer three questions only from the following:

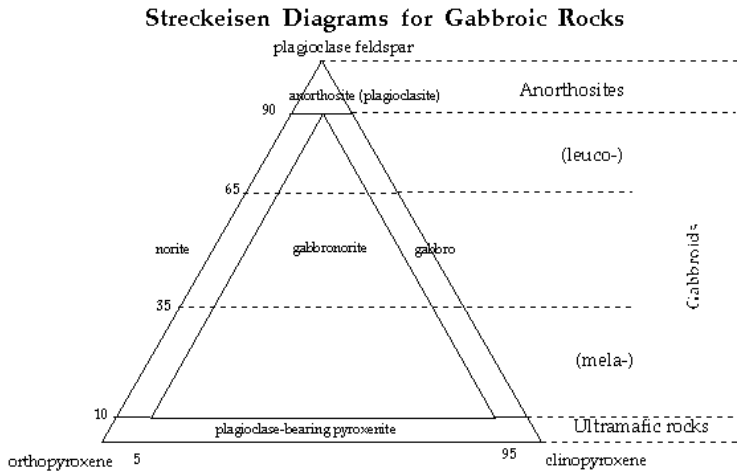
1- What are the general characters of igneous rocks? (16 Marks)

1- Volcanoes and related lava flows.
2- Cross-cutting relations to surrounding rocks, as in dikes, veins, stocks and batholiths.
3- Thermal effects on adjacent rocks, such as recrystallization, colour changes, and reaction zone.
4- Chilled (finer-grained) borders against adjacent rocks.
5- Lack of fossils and stratification.
6- Generally, structure less rocks composed of interlocking grains.
7- Typically located in Precambrian or orogenic terranes.
8- Characterstics shapes and sizes as laccoliths, lopoliths, sills, stocks, batholiths and lava flows.
9- Have several textures such as amygdaloidal, graphic, ophtic, pyroclastic or interlocking aggregates.
10- Have characteristic minerals amphibole, feldspar, leucite, mica, nepheline olivine, pyroxene, quartz and glass.

2- Explain the Streckeisen`s classification of gabbroic rocks: when the minerals are: plagioclase, orthopyroxene and clinopyroxene? (16 Marks)

Gabbroic rocks composed of plagioclase, pyroxene and olivine are classified and named according to the figure.

With Best wishes
Dr. M. M. Mogahed



For gabbroic rocks a plagioclase content of 35-65 percent is considered normal. Rocks that contain more than 65 percent plagioclase termed leucogabbro, whereas those contain less than 35 percent plagioclase are termed melagabbros. The common anorthosites generally contain labradorite or andesine but some contain bytownite or oligoclase. Ones that contain andesine or oligoclase may be called andesinites or oligoclasites respectively.

3- Write on the four main types of granitic rocks? (16 Marks)

a) Granites: the alkali feldspars making up more than 40% by volume of the total feldspar contents. These rocks are leuococratic and forms stocks and plutons.

b) Granodiorite in which calcium bearing plagioclase is accompanied by subordinate alkali feldspars (40-10%). The colour index is about 15.

c) Tonalite where alkali feldspars is either absent or makes less than 10% of the total feldspar contents. Their colour index is about 20 and they make with granodiorites the bulk of the world`s great batholiths.

d) Peralkaline granites and alkali granites, which have alkali feldspar only and usually making ring dykes.

4- **According to the chemical composition of basalt, there are three main types; explain these types?** (16 Marks)

1. **Tholeiitic basalts**
   - **I.** The chief pyroxenes are clinopyroxene relatively poor in calcium
   - **II.** Subcalcic augite, sometimes occur as phenocryst as well as in the groundmass.

III. Hypersthene is found with subcalcic augite in the groundmass and occasionally it forms phenocryests.
IV. Olivine is either absent or present only in small amount.
V. Plagioclase may be present both are pheocryests and in ground mass and ranging in composition from bytownite to labradorite.
VI. Iron oxides include titaniferrous magnetite and ilmenite.
VII. The basalts of the deep ocean floors are largely of this type.
VIII. They may be erupted in the early stages of island arc formation.

2. Alkali basalts:

I. Pyroxenes are lime rich, more or less titaniferrous augite.
II. Most alkali basalts have olivine as an additional essential constituents.
III. They are composed of olivine, titaniferous augite, labradorite and iron-ore, with accessory apatite. Sometimes potash feldspar appears as small amount of nepheline or analcite.
IV. Sometimes there are glass texture but the typical alkali basalt has none.
V. Generally, found as oceanic islands.

3. Calc-alkali basalts:

I. Are associated with calc alkali andesites, dacites and rhyodacites.
II. Typical calc-alkali basalts can have pigeonite, with or without hypersthene in their groundmass.
III. The calc alkali basalts are usually porphyritic with phenocryst of plagioclase ranging from bytownite to labradorite, clinopyroxene , sometimes orthopyroxene or olivine or both.