Hello

everyone. Welcome to this lecture on

classification of igneous rocks.

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In this module.

We will learn about different criteria used to

classify igneous rocks.

We’ll understand the basis for IUGS classification of

igneous rocks and understand the construction of QAPF

double triangle.

At the end of this module, you'll be able to enlist the

different criteria used for classification of igneous rocks.

Understand the basis for IUGS

classification. And you should be able to draw and plot on the

IUGS double triangle for felsic, and intermediate rocks

and all the triangles for mafic and ultramafic rocks.

There are different

classifications for igneous rocks.

Each classification is based on a different criteria depending

on the purpose of the

classification. For example, mode of occurrence is used to

classify igneous rocks as Plutonic, hyperbyssal and

volcanic igneous rocks.

Similarly, grain size or texture can be used to

classify igneous rocks as coarse grained, medium grained

and fine grained igneous rocks.

Colour index can be used to classify igneous rocks as

Hololeucocratic, leucocratic, mesocratic, melanocratic and Hyper

melanic rocks. Similarly, chemical

composition can be used to classify igneous rocks, like the

silica saturation, the alumina saturation or the alkali

content can be used.

One of the most important classification of igneous rocks

is based on mineral composition.

In this course we will learn the classification based on mineral

composition. There are two.

popular classifications, one by hatch and Wells and the other

one by IUGS.

The classification based on mineral composition is also

called as modal classification.

Modal classification is based on the essential minerals.

Essential minerals are those which are usually present in

dominant amount and govern the name of the rock.

While accessory minerals are usually present in small amount

and their presence or absence does not affect the name of the

rock. And as said earlier, Hatch and Wells and IUGS are two

very important classifications.

In this course we will learn the IUGS classification of igneous

rocks. But to learn, IUGS classification knowing

hatch and wells classification is a prerequisite. Also, you must

know the silicate minerals as they are the essential minerals

in igneous rocks.

So now we’ll understand the basis for IUGS classification of

igneous rocks. IUGS stands for International Union

of Geological Sciences.

This classification was recommended by IUGS in 1973 and

elaborated by Professor La Bas and Professor A. Streckiesen in

1991. It is also called as Streckiesen’s classification.

It was further modified by La Maitre and all in 2002.

So one of the most important factor of this classification is

that it pertains to plutonic or phaneric rocks. That means the

minerals should be identifiable

in. either hand specimen or thin section.

The classification is based on actual mineral content that is the

mode of the rock.

measured in volume percentage, that is, modal composition

by point counting technique.

So following mineral groups are used for classification. Q for

Quartz. A for Alkali feldspars which contain orthoclase microcline

Albite, perthite and antiperthite.

P for plagioclase, which includes both plagioclases

, sodic plagioclases that is albite oligoclase,

and andesine and calcic plagioclases, that is

labradorite, bytownite and anorthite.

F is for foids.or felspathoids such as nepheline, leucite and

others. M is mafic

ferromagnesian minerals. Now M only does not include only

mafic ferromagnesian members, but also includes accessories

like zircon and apatite. sphene, epidote, garnet and carbonates.

That means all other minerals other than Q APF.

Rocks with M less than 90% are classified according to their

light colored constituents

That is QAP&F.

And their quantitative mineralogical

composition is plotted in a QA PF double

triangle joined together on AP base.

Although the actual mineral composition may comprise of

all the constituents, that is QAP and M or APF&M for

classification purpose, the composition is re calculated

on a felsic basis and projected on QAPF plane so

that Q + A + P is equal to 100 or A + P + F is

equal to 100.

So these diagrams.

Are used to plot.

Bing mineral composition.

Q is 100 here.

And it is zero along the opposite side of the triangle.

Similarly, A that is Allkali feldspar is 100 here. It is zero

along the opposite side of the

triangle. Plagioclase is 100 here and 0 on this side

of the triangle, so zero 10, 20 thirty 40, 50 sixty 70 80 90 100

will be plotted here.

Similarly, for APF triangle A will be 100 here P is 100 here

and F is 100 here.

Now these two triangles are combined on the AP base that is

A&P is combined is common for both the triangles, so they are

combined and the QAPF double triangle looks like this QAP&F.

Please note that mafic igneous

rocks are called as Gabbroic rocks in IUGS classification,

two triangles are used to

classify. Gabbroic rocks. In the first triangle, Calcic plagioclase,

clino pyroxene, and ortho pyroxene are plotted on the

three apices of the triangle.

Plagioclase will be 100 here clinopyroxene will be 100 here

and orthopyroxene will be 100

here. And on the other Triangle plagioclase.

Pyroxene, both the pyroxenes are combined here and olivine

are plotted on the three apices of the triangle.

While for the ultramafic

igneous rocks. Olivine clinopyroxene and orthopyroxene

are plotted on the apices of

the triangle. So these triangles are used for plotting the

compositions of igneous rocks.

So to summarize.

Various criteria are used to classify igneous rocks. IUGS

classification uses mineral composition in volume percentage

to classify rocks.

And mineral composition are plotted on triangular diagrams

for various categories of rocks.

These are the references for more reading on this topic.

Thank you very much.