In this particular module,

we are going to study about

textures of igneous rocks.

This will be the first.

In this module we will be able to distinguish

between Crystallinity and granularity.

And to outline igneous rocks

based on various textures.

End of this module we will be able to understand

how textures are described in igneous rocks.

And classify these igneous rocks

based on these various textures.

Also, to categorize and identify the rocks

and hand specimen based on textures.

So let us take a look on what is

the texture of the igneous rocks?

Texture of igneous rock is defined as

the mutual relationship of different

mineralogical constituents and glassy matter

in the rock made up of a uniform aggregate.

Textures are best studied in thin

sections under the microscope.

These textures are determined by the size,

shape and arrangement of these

constituents within the body of rock.

Hence, an accurate description of

Igneous textures requires consideration

of four points.

1st is the degree of crystallization

or crytallinity?

Second, the absolute size of the crystals,

or the granularity.

Third, the shape of the crystals.

Fourth, the mutual relation of the crystals.

The texture of an igneous rock may

therefore be regarded as a function of

its Crystallinity, granularity and fabric.

Fabric of the igneous rock is in turn

basically the shape of the crystals and

the mutual relationship of the crystals.

Crystallinity, so this is the measure

of the ratio between the crystallized

and non crystallized matter.

So basically here we looked at the

rock and we check how much of it has

been crystallized and how much of the

constituent minerals are non-crystallized.

A rock that is composed entirely of

crystals is said to be hollocrystalline.

When it consists completely of glass,

that is, there are no crystals formed.

The term hollohayline

or hyaline is used.

When the rock is composed partly of

crystals and subordinate of glass,

or made up of very fine crystals,

the term hemicrystalline/ hypocrystalline/

merocrystalline is used.

And finally,

when the rock is composed mainly

of glass and very less amount

of crystalline matter,

the term Hemihyaline or

Hypohyaline is used.

So. holocrystalline textures is best noted

and platonic as well as hypabyssal rock.

That is becauses you will find this rocks

having sufficient time for crystals to form.

As the cooling is quite slow.

Where is hemicrystallline,

Hypocrystalline/

Merocrystalline is best seen in volcanic

Rock, as that is a lot amount of

glassy matter and the time for

cooling is considerably fast.

Whereas holohyaline types exhibited

in volcanic rocks that are

subjected to sudden cooling.

So mainly the rock remains completely

in a glassy form and there are

no development of any crystals.

This is a texture that is seen and pink

granite called as a hollorystalline.

As you can see in this particular image,

the crystals that are formed a well developed

and you can see it with your naked eye.

So when such crystals are formed

throughout the rock body it is

called as hollocrystalline.

Hemicrystalline texture, here

as seen in quartz poryphyry.

This here you will see quartz as well

as your orthoclase feldspar that

is existing, as a larger crystal.

 that is seen in a crystalline form and

in present in a very fine grain matrix.

Thus hemicrystalline texture is

noted in this specimen.

Let us take a look at this rock

type Obsidian wherein you see there

are no development of any crystals.

The rock is totally made up of

glassy matter due to sudden chilling

and cooling of the volcanic rock,

so the term hollohyaline texture is used.

Those holocryastalline rocks in which mineral

grains can be recognized with an unaided eye.

Are called as phaneritic of phaneric

While those minerals that are so

Small, that their outlines cannot be

resolved without the aid of hand

lens or microscope are termed as aphanetic.

Aphanetic rocks are further described as

either microcrystalline or cryptocrystalline.

Whether or not the individual constituents can

be resolved under the microscope or not,

respectively.

Let us take a look at the next type

of texture called as granularity.

Granularity is defined.

The grain size of the various

components of the rock.

These are the average dimensions that

are taken into consideration of the

different constituent minerals which

are taken into account to describe

the grain size of the rock as a whole.

The absolute size of the crystal,

or granularity in igneous rock ranges

from sub-microscopic dimensions to

crystals that could be measured in yards.

Let us take a look at the four types.

First is a very coarse grain.

These are those,

when the average grain size of the

mineral constituent is above 2 centimeters,

so they are very coarse grain like seen

in pegmatites. Then you have coarse grain,

If the crystals are visible to the naked eye,

the rock is set to be coarse grain.

Here the average size is between two to five,

2 centimeters to 5 millimeters.

These are seen mainly in plutonic

igneous rocks.

Those that are medium grained, here

when the individual crystals cannot

be distinguished with the naked eye

and the use of magnifying glass or

a pocket lens becomes necessary for

identifying all the constituent minerals.

The average size lies between

5 millimeters and 1 millimeter.

These are mainly seen in hypabyssal rocks.

Finally, you have the fine grained rock.

When the average size is less than

one millimeter,

here the constituent mineral grains are

identified mainly using microscopes

under thin sections.

These are seen in volcanic igneous rocks.

Let us take a look at the hand

specimens of gabbro over here.

This particular rock is showing

a coarse grained texture.

But is this specimen called as dolerite

which is a hypabyssal rock

is showing a medium grain texture.

And a hand specimen of basalt showing

a fine grained texture, over here,

Since the size is less than one millimeter,

it is best seen under microscope

as thin sections.

The texture of an igneous rocks

help us to know, if the rock is

plutonic or of volcanic in origin.

When the magma and lava cools,

mineral crystal starts to

form, in this molten rock.

Plutonic rocks which slow cooling underground

have development of larger crystals.

Because these crystals have sufficient

time to grow to considerably large size.

Whereas volcanic rock,

which cools rather quickly

as it is above the ground,

have small crystals because the

crystals do not get sufficient

time to grow as it cool quickly.

Therefore, it is suggested that,

Slower cooling, that is beneath the earths surface or within thick layers of masses of lava, promotes formation of crystals and larger grain size and rapid cooling promotes aphanetic and glassy type of textures as seen in volcanic rocks.