

Taking up the unit.

3 module name, crystallography.

Definition of a crystal crystalline

state and amorphous state.

My name is Kimberly Fiona Afonso.

In this particular module,

we will highlight the definition of

a crystal and we shall differentiate.

between crystalline and amorphous state.

By the end of this module,

we will be able to define a crystal.

and summarize the properties.

of crystalline substances and

learn the difference between the

crystalline and amorphous state.

Here, in this image we see crystals

of salt or sodium chloride halide.

Let us first brush through.

the definition of a mineral.

It is a naturally occurring inorganic

homogeneous solid substance which has

a definite chemical composition and

and highly ordered atomic structure.

So, what do we mean by naturally occurring?

These are substances that occur.

in nature and cannot be created

or manufactured by people.

Inorganic means it cannot come from living

things or something that once lived.

Solid has a volume and shape and atoms

here are packed together and cannot

move as these are solids definite.

Composition means every time we see

the same mineral it has the same

chemical composition that can be

expressed by a chemical formula.

They can be in your form,

for example, gold or silver,

or can be in a compound form where

you have two or more elements that

are combined together such as silica.

They have a characteristic

crystalline structure.

In other words,

atoms here are arranged within the mineral in a specific ordered manner.

So, what does crystallography is the science which deals with the study of crystalline solids and the principle that governs their growth, external shape and internal structure.

The word is derived from the Greek word for kristalose, meaning clear eyes.

So, what is the definition of a crystal?

It is a homogeneous solid, possessing long range 3 dimensional internal order arrangement, and when the conditions are favorable they may be bounded by smooth plain surfaces and assume a regular geometric form, something that is formed by the

solidification of an element compound
or a mixture and has a regular repeating
internal arrangement of its atoms.

Which is often reflected in
its external phases.

The atomic structures of crystals
can be studied with the help of
X rays or transmission electron
microscope in crystallography.

The external shape is denoted
by the word habit whereas form
consists of an assemblages of faces.

Happiness controlled by the
environment in which the crystal grows.

It can vary within locality.

At one place it could be equal,
whereas at some other place it
could be fibrous.

Crystal in the notes that there
is an ordered arrangement of atoms
in the crystal structure,

thus a crystalline solid when it
has well-formed crystal phases,
the mineral is said to be euhedral.

If the faces are imperfect,
then Subhadra and without any faces
development it is called a header.

When the mineral shows no
external crystal and form,
it is said to be massive.

But it's the definition of crystal
in a traditional sense.

Means regular, geometric, solid,
bounded by smooth plane surfaces.

Chris, let substance may occur in fine green
aggregates that their crystalline nature
can be determined by a dove microscope
and a designated as microcrystalline.

If the aggregates are so fine that they
cannot be resolved by a microscope but
detected by X ray diffraction technique,
then over crypto crystalline is used.

Those that lack any ordered
internal atomic arrangement.

Are called as amorphous.

Naturally occurring model substance
are designated as metalloids.

Majority of the minerals are
crystalline substance and display.

A characteristic geometric forms.

The study of external form or the
morphology of crystal is known
as morphological crystallography
and the study of these forms help
and identification of minerals.

So how are these crystals form?

Crystals can be formed from
solution such as sodium chloride
or from melts and vapors depending
on the temperature and pressure.

This process is called as crystallization.

The first stage is nucleation,
that is, C needs to be formed first.

The nucleus is the result of count
together of various ions in the solution
or from the milk to form the initial
regular structured pattern of a crystal.

Solid after this,
the crystal will grow.

In other words,
addition of ions or atoms to the
outside of the crystal occurs in
a regular and continuous pattern.

So let us take a look at the atomic
arrangement within this Klein matter,
or how are these atoms placed in
three dimensional internal order for
crystal these can be considered as
a repetition or a more of a motive
or a point that is a unit of a
pattern such that the environment
around this motive is identical.

This motive in crystals could be molecules,
ions or anionic groups.

The order pattern that.

Characterizes crystalline materials represent.

a low energy state than random patterns.

For example,

if you lay brick in a regular fashion,

one above the other,

eight represents a low energy state,

and if you have haphazard

arrangement of bricks,

it will be a high energy scale

and therefore less stable.

A pattern is generated by repeating a motive

in a regular sequence in a new location.

Any motion,

for example translation,

rotation or a combination of

translation and rotation that brings

the original motif into coincidence.

With the same motif elsewhere in a

pattern is referred to an operation.

So, what else space?

Latex is the constant particles of crystalline solids are arranged in a definite fashion in three dimension space.

Such a regular arrangement of the constituent particles of crystals in 3D space is called as crystal lattice or space lattice.

Shore completely ties.

It is possible to select a small as three dimensional portion which repeats itself in different direction to generate a complete space lattice.

This unit is called as a unit cell.

So let us take a look at the unit cell.

The smallest 3-dimension portion of a complete space lattice which when repeated over and over again in different direction, will produce the entire space.

Lattice. Here is an image showing the representation of space and unit cell.

The size and shape of the unit cell is determined by the length of the edges of the unit cell represented by ABC and the angles between these lengths of the axes is given by alpha, beta, and gamma.

The symmetry observed in crystals, as exhibited by their crystal faces is remember it's due to the internal ordered atomic arrangements in the crystal structure.

Due to this internal order arrangement, the crystal is then set to have a well bounded crystal phase.

This arrangement of atoms in crystals is called as lattice.

Crystal faces developed along planes that is defined by the points in the lattice.

In other words, all crystal faces must intersect atom or molecule that make up the points.

One face is more commonly developed

in a crystal if it intersects a

large number of these lattice points,

this is known as previous law.

For example, in this particular image,

the phases will be seen more along the

lines along one and less a little less

common along two and least common around 4,

three and five.

So what is crystalline state?

These are composed of points or motifs

arranged in a definite space patterns.

Each point considered to be the center

of gravity of either an atom ion,

a partial molecule,

or a complete molecule.

Environment of any one such point

is identical in orientation and

arrangement with any other similar point.

Such patterns of such points in

space is called a space lattice.

Each space lattice is an assemblage of

units where this unit cell is formed.

During crystallization,

it becomes the center of crystallization

or the nucleus.

Units are then added up to produce

the expanding lattice as long as

it grows without interference,

it will be bounded by plain flat surfaces

arranged in a regular geometric pattern,

which is in turn controlled

by the arrangement of points

within the lattice space.

The resulting geometric form is an

external expression of this orderly

internal arrangement of the crystal units,

of which it is composed.

Such form is said to be a crystal.

Here we can see you have a sodium

chloride crystal or halite or

rock salt and you see it is

bounded by smooth plain surfaces,

which is a representation of the way
this sodium and chlorine ions are
arranged in a systematic internal order,
giving rise to the sodium chloride crystal.

Atoms in crystalline substance are
arranged on a regular repetitive
pattern due to which the physical
properties of crystals are different
and different direction.

For example, electrical conductivity,
optical property elasticity are basically
different in various directions,
except if the substance is
crystallising in cubic system,
they have a definite melting point.

That is,
the temperature will remain constant
until all the substance has melted.

Let us take a look at what
is the amorphous state here.

There is no regular internal structure,

therefore no external

geometric form is possible.

The atoms are situated at random

as in a state of liquid solid.

Amorphous substances are therefore

regarded as supercooled liquid.

There is a lot of vacant space

that is left between atoms,

hence they have a low specific gravity.

Then the crystal of the same

composition for example.

Quartz and Opal having the

chemical composition of SiO_2 .

Quartz has a higher specific

gravity compared to Opal which

is an amorphous substance.

Lack of definitive melting point and

these melt over a range of temperatures.

or amorphous substances are isotropic.

That is, their physical properties

are similar in all directions.

Here is a summary or basically the
difference jotted down between a
crystalline and amorphous substance.

These are references.

Thank you.