welcome students welcome to another

session of paper minerals and rocks
today's topic is mineralogical structure
of earth
planetary minerals and native elements
mineral structure .The topics which we
are going to cover
in this module are layers of the earth
mineral groups mineralogical structure
of the earth
Earth is made up of varying proportions
of
over 90 naturally occurring elements
like hydrogen carbon oxygen silicon
and many more .In most geological
material
these elements combine in various way
and they form minerals. most minerals
are compounds and they have
cations
as well as anions that is positive
and negative charge. we group
minerals into classes on the basis of
their predominant
anion that is a negative group.
most minerals fit into one of these
eight mineral groups eight mineral
groups are
oxide, sulfide, sulphates
halides ,carbonates , phosphates
silicates and native minerals.
Let us look at each of them briefly.
The first one is halide.
halide minerals are salts
that are formed when salt water
evaporates.
the chemical elements known as halogen
those are fluorine, chlorine, bromine
or iodine bond with various metallic
elements
to make halide minerals .the most
common example of halide is halite
which is also known as table salt.
the next group of mineral is sulfates
sulphate mineral contains sulfur atom
bonded to oxygen atom that is

SO4 minus 2 like halides
they form where salt water evaporates
the sulfate group contains many
different minerals
but only few are common. the most common
example is
gypsum .gypsum
and anhydride another sulfate mineral
these two are important
industrial sulfates used in manufacture
of plasters
let us go to next group sulphides
sulfide minerals consist of sulfur
combined with one or more metal
unlike sulphates .sulfide do not contain
oxygen many sulphides are extremely
important for minerals the most common
examples are
Pyrite , chalcopyrite and galena
of this pyrite is also known as fool's
gold
since it resembles gold.
next mineral group is carbonates
the basic carbonate structure is one
carbon atom
bonded to three oxygen atoms
carbonates include other elements such
as calcium
iron and copper calcite
that is caco3 is the most common
carbonate mineral .next group
is phosphate phosphate mineral
contains a complex anion po4
minus 3. in the phosphate
phosphorus arsenic or vanadium bond to
oxygen
to form a tetrahedra .apatite is the
substances
substance that make up both teeth and
bone
is example of a phosphate.
next important group of mineral is
native elements
native element contain atoms of only one
type of element
only a small number of minerals are
found in this category

there are about 20 elements that occur
naturally in their native state
as minerals few of them however
are common enough to be of economic
importance
these elements are those that occur in
nature
in uncombined form that is in their pure
form
they have a definite internal atomic
structure
and therefore they are called as native
element mineral some of the mineral
in this group are rare and valuable
gold silver sulfur and diamond
are example of native elements and the
last mineral group
is silicate mineral silicates are by far
the largest mineral group
feldspar and quartz are the two most
important common silicate minerals
both are extremely common rock forming
minerals
silicate minerals make up about 95
percent of the earth's crust
the basic building block for all
silicate mineral
is silica tetrahedron to create
the wide variety of silica means
silicate minerals
this pyramid-shaped tetrahedron
structure
is often bonded to other elements such
as calcium
iron and magnesium now
let us look at the mineral abundance of
the earth
or mineralogy of the earth before that
we should know we should know that
earth is compositionally divided into
three distinct layer
that is crust mantle and
core. crust is the uppermost layer
then we have mental and below mental is
core
it should be noted that earth interior
interior

were deciphered using behavior and
velocity
of seismic waves let us look at the
first layer
that is crust crust is the topmost
or the outermost and the thinnest layer
of the earth
as this layer is accessible to human
the study on crust is detailed and
therefore
their outcomes are reliable
let us look at the chemistry crust is
dominated by very few elements
listed in order of their decreasing
abundance
as follows we have oxygen which is 46
percent
silicon 28 aluminium
8 iron 5.5
calcium 4 percent sodium
2.5 percent magnesium
2.5 potassium one percent
and other elements they comprises one
percent
this you can see in this pie chart
silicon
and oxygen are the dominant
elements
present on the earth crust if you see
this chart oxygen is the only anion
and therefore becomes the obvious choice
for other elements to bond with.
earth has two types of crust
oceanic and continental
oceanic crust is composed of basalt
it is rich in magnesium
iron calcium and aluminium
and are found in minerals like olivine
pyroxene and lagrange feldspar
continental crust
is more diverse old and composed
of incompatible elements that do not
fill
well in this mantle like
potassium and sodium the elements are
concentrated in
low density minerals such as quartz and

feldspar
more than 90 on the crust is composed of
silicate mineral
the most abundant silicate mineral are
feldspar that is plagioclase 39
percent
and alkali Feldspar 12 percent
other common silicate minerals are
quartz
which is 12 percent , pyroxene 11percent
amphibole 5 percent mica comprising of 5
and clay mineral comprising of 5
the last of the silicate family
comprises three percent of the crust
only eight percent of the crust is
composed of non-silicate minerals
those are carbonates oxides sulfides
many more. let us look at the second
layer
of the earth that is mantle
most of the earth is made up of mantle
mantle extends from the base of the
crust and
extends up to depth of 2900 kilometers
the elemental composition of the mantle
is as follows
oxygen comprises 44 percent
magnesium 23 percent silicon
21.5 percent iron
six percent aluminium 2.3 percent
and calcium 2.3
again if you look at this pie chart you
will see
oxygen is the only anion present
therefore oxide dominates the chemistry
of the
mantle the mantle is almost completely
silicate
and rich in magnesium the minerals of
olivine and pyroxene
are the most common the example of
minerals that you will find inside the
mantle
include olivine pyroxene spinel
and garnet and the last layer
is core core is the innermost layer of
the earth

it begins at the depth of 2900 kilometer
and ends at 6370 kilometer
around 97 percent of the core
is made up of iron rest
is rest three percent is
Ni , S and O
the core is divided into two layers
outer core
and inner core outer core
because of very high temperature is
liquid
whereas the inner core because of very
high pressure
is solid however chemically
they are both same
if you look at the chemistry around 97
of the core is made up of iron and rest
3 percent is nickel
sulfur and oxygen the core can be called
as
iron nickel alloy meteorites has
provided important clue
about the chemistry of core the earth's
core
is mainly iron and nickel with small
amount of
lighter elements such as such as
oxygen or sulfur
thank you
you