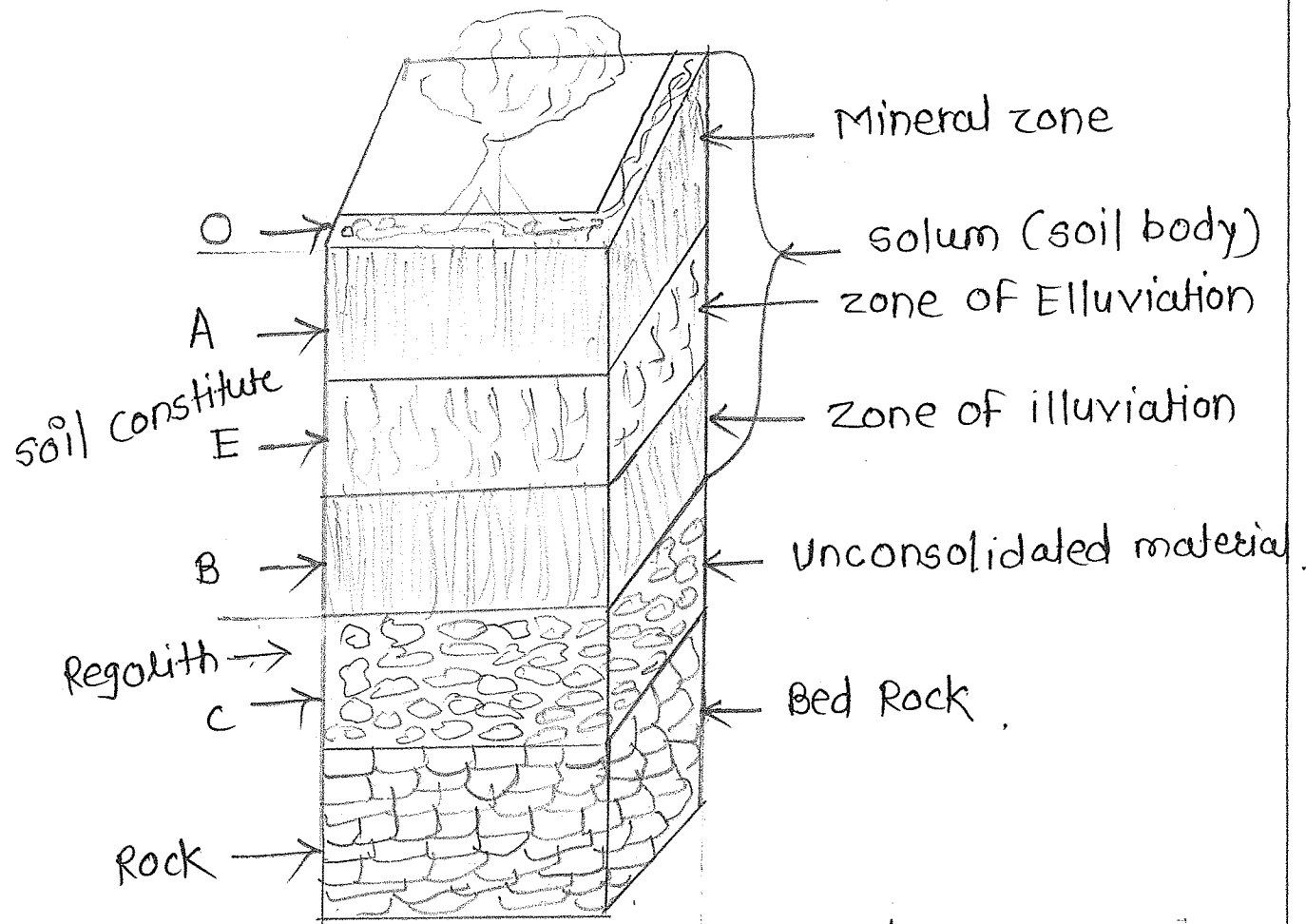


Q1 Describe the Details structure of soil profile

⇒ * Defⁿ soil profile → soil profile is vertical section of soil show in various layer from the surface to the unfacted parent Material.



* soil Horizonte → It is layers of soil aproximetly parellel to the soil surface differing in propertise & characteristics from adjacent layer below or about.

(1) 'O' Horizon →

- i) The 'o' group is the organic horizons which is form and the Heavy surface of the Minerals.
- ii) It developed from the plant & animal residues
- iii) It is present in forest Area & absent in Mineral soil

iv) It is divided into three Horizon.

- a) Oi - less decomposed Material
- b) Oe - Medium decomposed Material
- c) Oa - Highly decomposed Material.

(2) 'A' Horizon →

- i) It is present in surface soil
- ii) It is called as topmost Mineral Horizon
- iii) It contain decomposed organic matter.
- iv) The surface and it is characteristics as zone of washing out in an maximum leaching
- v) It is dark in colour.

(3) 'B' Horizon →

- i) It is present in sub-soil
- ii) This Horizon are the zone of materials such as iron, aluminium oxide and silicate pit from above Horizon.
- iii) It is dark in colour
- iv) It is called accumulate Horizon.

(4) 'C' Horizon →

- i) It is developed by unconsolidated parent Material
- ii) It formed from below the solum
- iii) This Horizon is outside the zone of major biological activities.
- iv) It may or may not be the same as the parent Material.

(5) 'E' Horizon →

- i) It is called leaching Horizon
- ii) silicate, clay, Fe & Al oxide leach out from this Horizon
- iii) It is light in colour.

(6) 'R' Horizon →

- i) Bed rock Granite basalt quartzite and Indurated limestone or sand stone are example of bed Rocks.
- ii) There is very little evidences of the weathering.

Q2] Define Weathering & Types of Weathering and explain the chemical weathering.

⇒ * Defⁿ Weathering → Weathering is a process of disintegration and decomposition of rocks and minerals which are brought about by physical agents and chemical process leading to the formation of "regolith".

(OR)

The process of transformation of solid rocks into parent material or regolith is known as "weathering"

* Types of Weathering → process of Weathering -

(1) Physical Weathering -

- i) Temperature -
- ii) Water -
- iii) Frost -
- iv) Action of Glaciers -
- v) Wind -

(2) chemical Weathering -

- i) solution -
- ii) Hydrolysis -
- iii) oxidation - ~~reduction~~
- iv) Reduction -
- v) Hydration -
- vi) Carbonation -

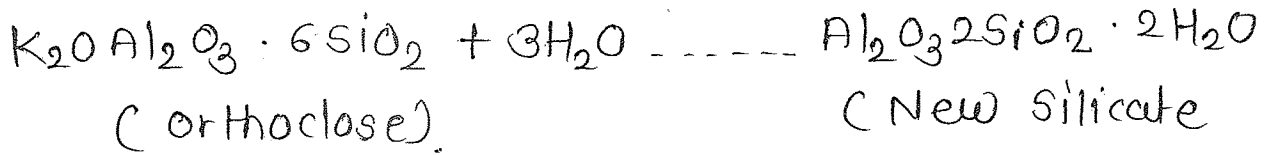
(3) Biological Weathering →

- i) Man & Animal -
- ii) Root's of higher plants -
- iii) Microorganism. -

* CHEMICAL WEATHERING *

11) Hydrolysis →

~~It~~ brings about change during the ~~weathering~~ The brings about the most importance change during the weathering of Minerals many aluminium silicate.



The Reaction is very slow in the presence of pure water.



The more complex mineral like plagioclase feldspar pyroxenes.

ii) oxidation →

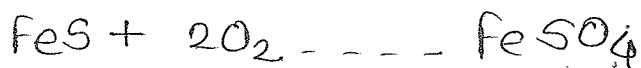
- oxygen in the presence of water converts many minerals into oxides the oxides are further converted the Hydroxides.

- It occurs after the Hydrolysis.

1. A rusty crust is formed on the surface of rock.

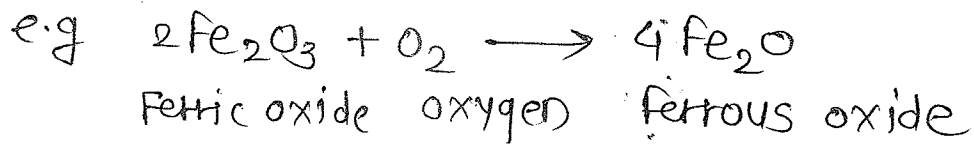


iron sulphide- sulphate of iron.



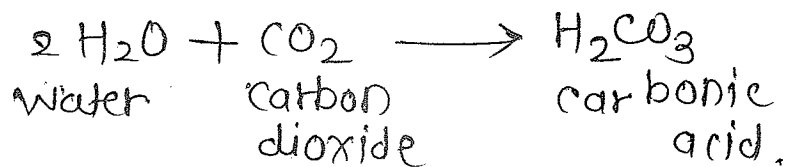
(3) Reduction →

- The process of removal or loss of oxygen is called Reduction.
- It is equally important in changing colour of soil to grey, blue or green as ferric iron is converted to ferrous iron compound.

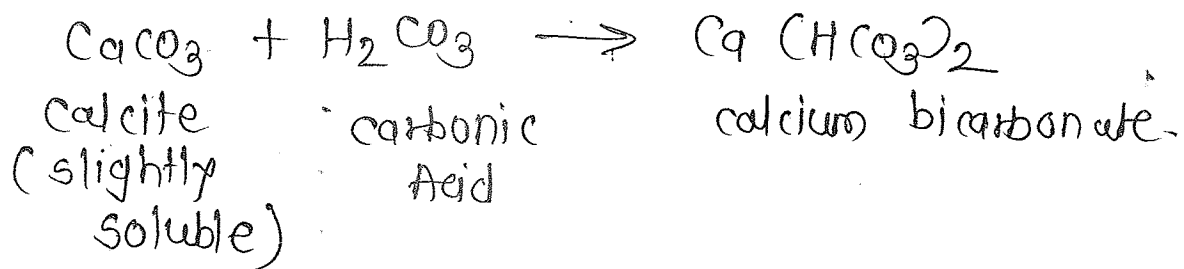


(4) Carbonation →

carbon dioxide when dissolved in water it forms carbonic acid.



The carbonic acid or carbonated water attacks many rocks and minerals and brings them into solution.



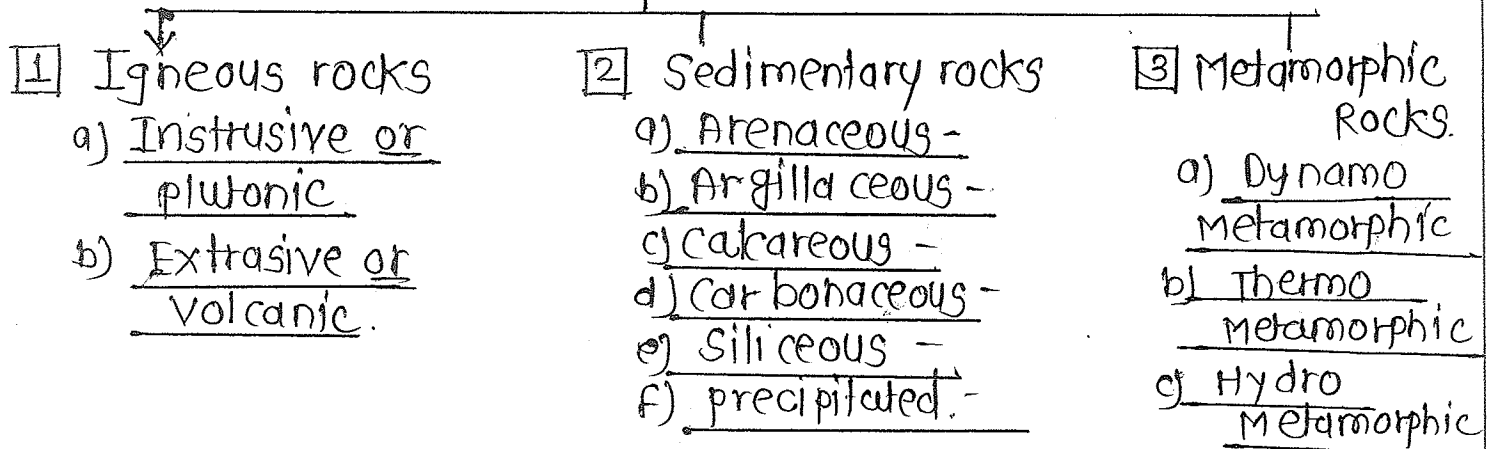
Q.3] Define Rocks & classification of Rocks.

⇒ Defⁿ Rocks → It is an aggregate of mineral matter & composed of one or more primary or secondary minerals.

(OR)

Rocks may be defined as the mixture of two or more minerals.

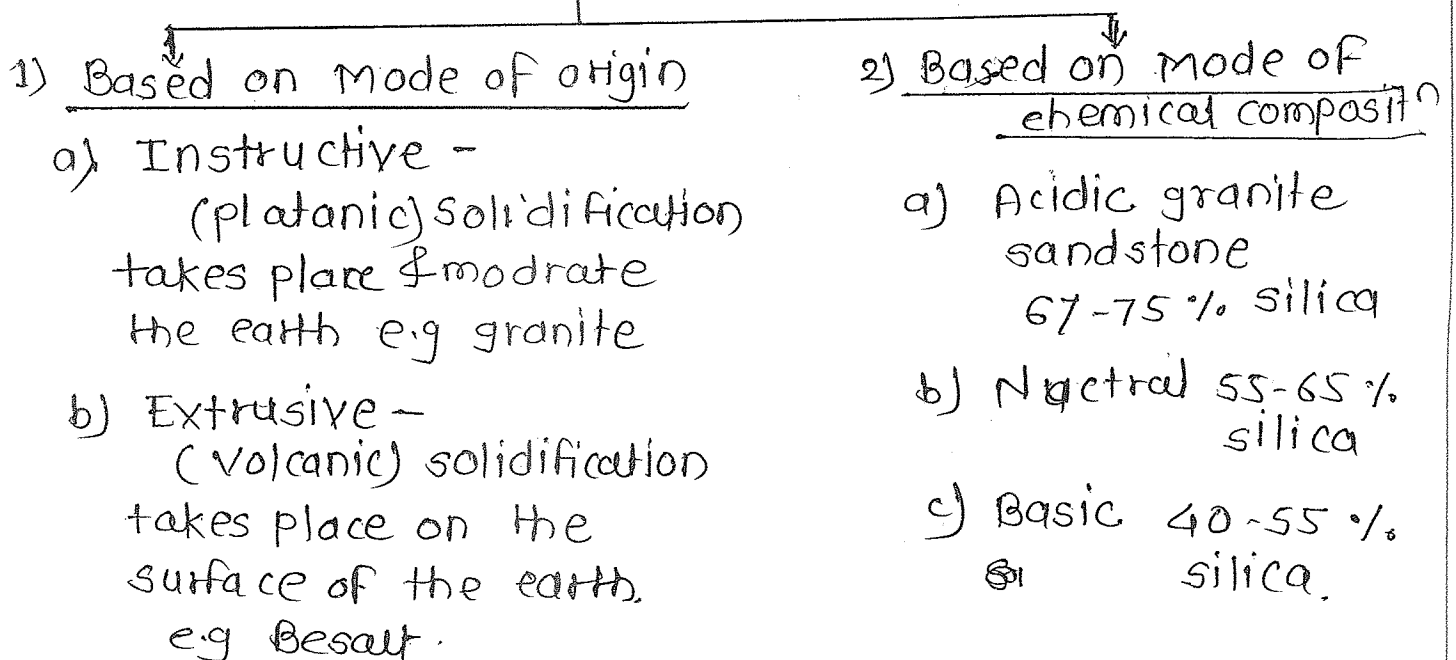
Rocks



① Igneous Rocks →

- It is formed by the molten mass cooled & consolidated into solid rocks is called "Igneous Rocks"
- Igneous Rocks containing 95% in earth crust & about 16 km thick.
- They mostly consist of primary minerals eg Quartz, mica, Feldspar.

Igneous Rocks



② Sedimentary Rocks →

* Types Formation stages →

- i) weathering
- ii) transportation
- iii) Deposition or sedimentation
- iv) Diagenesis i.e transformation of unconsolidated sediment Rocks.

* classification of sedimentary Rocks -

- 1) Arenaceous rocks -
 - i) It consist of coarse particle
 - ii) They are light usually granular & porous
 - iii) e.g sandstone, conglomerate.
- 2) Argillaceous rocks -
 - i) It consist of small size particle
 - ii) They are light to dark, thickly laminated structure.
 - iii) e.g mudstone, shale.
- 3) Calcareous rocks -
 - i) It consist of calcium carbonate & magnesium carbonate
 - ii) e.g limestone, dolomite
- 4) Carbonaceous rocks -
 - i) It formed from decomposing vegetation under anaerobic condition mainly consist of carbon.
 - ii) e.g coal, peat
- 5) Siliceous rocks -
 - i) They are of organic origin. Have been formed from parts of minute plant & animals.
 - ii) e.g Diatomaceous earth,
- 6) precipitated rocks -
 - i) They are mainly deposits, formed as rock masses by cooling evaporation e.g gypsum, rock, salts.

Q4 - Define soil structure. explain different types of soil structure with figure.

⇒ Defⁿ soil structure - It is the combination or arrangement of primary soil particles into secondary particles or units called pods or aggregates.

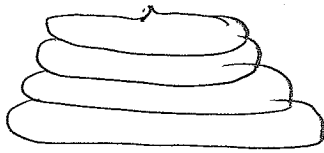
(OR)

The arrangement and organization of primary & secondary particle in a soil mass call as soil structure

* Types of structure →

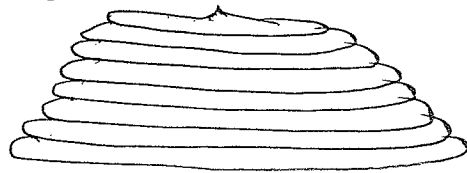
1) Platy → - In this Horizontal dimentions are much more developed than the vertical.

a) plate like -



Aggregate are aranged in thick Horizontal plate

b) Laminar -

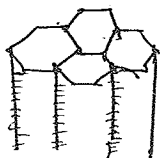


Aggregate are aranged in thin Horizontal plate

- It is present in surface layer of virgin soil
- It is product of soil forming Rocks.

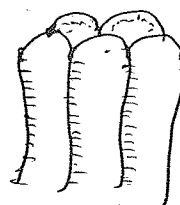
2) Prism like → The vertical axis is more developed than Horizontal It giving a pillar like shape.

a) Prismatic -



When the top of peds flat

b) columnar -

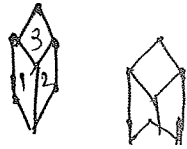


When the top of peds is rounded.

- They Found in commanly sub soil Horizon in arid & semi arid regions.

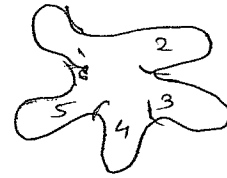
(3) Block like - All dimension are about the same size & peds or cube like with Flat or rounded faces

(a) Angular blocky



When flat face & edge are sharp

(b) Sub angular blocky



When face & edge are rounded.

(4) sphere like →

(a) Granular



less porous

(b) crumbly



very porous

- found in surface layer
- The soils High in organic matter.

Q5] Mention different pedogenic processes and explain any two of them.

⇒ Two types →

- (1) Fundamental pedogenic processes
- (2) specific pedogenic process.

(1) Fundamental pedogenic processes -

- (i) Humidification
- (ii) synthesis
- (iii) Eluviation
- (iv) Illuviation
- v) Horizonation
- (vi) Homogenization

(2) specific pedogenic processes. -

- (i) calcification -
- (ii) pod solization -
- (iii) Laterization -
- (iv) Salinization -
- (v) Alkalization -
- (vi) Gleization -
- (vii) pedoturbation -

(1) Fundamental pedogenic processes—

- (a) Humification → It is the process of decomposition of organic substance. Decomposition of organic matter is a complex process.
- The Bacteria & Fungi break down the complex compound to form simple compound called "Humus". This process is called Humification.
- (b) Eluviation → It is Mobilization & translocation (washing out) of salt e.g. Al_2O_3 , $CaCO_3$.
- In this process removal of salt in soil solution by percolation of water.
- (c) Illuviation → In this process dissolved subs. are deposited in soil Horizon by gravity force, capillary force, drainage is called as Illuviation.
- (d) Horizonation → It is the process of formation of layer in soil.
- The formation of differentiation layer are due to fundamental process.
- (e) Synthesis → part of the material formed by decomposition are synthesized into New Compounds.
- The important New compounds synthesised are clay minerals.

Q6 Define soil survey? Types of survey & its Importance

⇒ Defⁿ soil survey → soil survey is essentially a study and mapping of soils in their natural Environment

* Types of soil survey →

- (i) detailed survey -
- (ii) Reconnaissance survey -
- (iii) Detailed - Reconnaissance survey -
- (iv) semi-detailed Survey -

(1) Detailed survey → Elaborate mapping is done demarcating the lowest categories of taxonomic & mapping units.

- pedones are examined and sampled for detailed of the soil

(2) Reconnaissance survey →

- The mapping is less elaborate & larger areas are surveyed rapidly
- This survey useful in new regions for general planning

(3) Detailed - Reconnaissance Survey →

- They constitute element of both detailed & reconnaissance survey.

(4) Semi-Detailed survey →

- This survey comprise very detailed study of some selected strips.

* Importance → i) To get information about soil genesis
ii) To get information about soil resources.
iii) for planned land use & resource area.

Q7 What do you mean Ion Exchange. Explain the importance of cation exchange in soil.

⇒ Defⁿ ION EXCHANGE → It is the surface property of the soil colloids. It is exchange of ions betⁿ soil solution & the ions adsorbed on soil colloids

* Importance of cation Exchange in soil →

(1) zeta potential -

(2) valency of ions -

(3) size and degree of Hydration of ION -

(4) Concentration of ions in solution -

(1) zeta potential → The rapidity of exchange depends upon zeta potential

- Higher the zeta potential of the cation more easily it replaced.

(2) valency of ions → Higher the valency of the cation greater is the replacing power of the ion & more it resist replacement.

(3) Size and degree of Hydration of ION →

- cations Have same valency the rapidly & ease of exchange increase with effective size.

(4) Concentration of ions in solution →

- cation exchange also depends on concentration of ions in replacing solution (soil soln) Greater the concentration of cations,

Q8 What is soil formation & state factors and explain any two of them.

⇒ Soil Formation → The evolution of soil body which its characteristics profile feature from the soil parent's materials is known as soil formation.

$$S = F [P, C, B, R, T]$$

Meaning - S - soil properties

F - function of

P - parent material } Active.

C - climate

B - Biosphere

R - relief } passive

T - time

(1) Parent Material →

i) parent material influences soil formation by their different rate of weathering

ii) The nutrient content for plant use & the particle size

[sand stone = semi sand the less developed soil is greater will effect of parent material on the properties of soil]

iii) The soil develops lime stones parent rocks may be claying & off good natural fertility while sand stone.

iv) e.g. 1) Acid igneous rocks

2) Basic igneous rocks

3) Limestone -

Give rise to calcareous soil.

- (2) Biosphere → The Activity of living plants & animals and the decomposition of their organism matter have effect on soil development.
- a) microorganism - Responsible for Humification & mineralization of organic matter.
 - b) Ants & Earthworm - Transport soil material from one depth to another.
 - c) Man - cultivation, puddling, using manure change the soil profile.

Q9] Define ION Exchange and state its Importance of ion Exchange.

⇒ Defⁿ ION Exchange → It is the surface property of the soil colloids it exchange of ions between soil solution & the ions adsorbed soil colloids.

* Importance of Ion Exchange in Agriculture and significance →

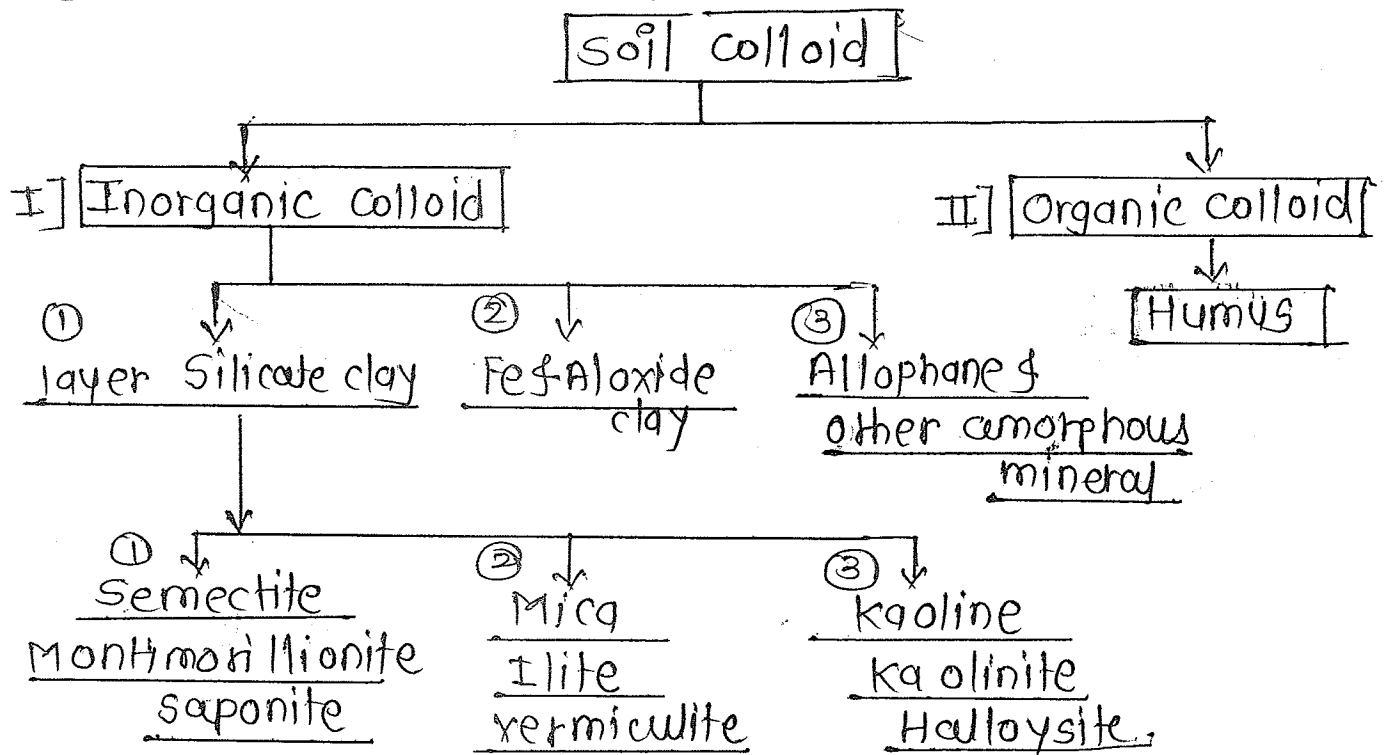


- (i) Availability of Nutrients / Nutrient storage
- (ii) Fixing of fertilizer elements in replaceable form Nutrient Fixing capacity
- (iii) Effect of fertilizers and fertilizer practices.
- (iv) Physical and chemical properties are affected by the cation adsorbed.
- (v) Nature of soil structure

Q10] Define soil colloids. and Types of soil colloids.

⇒ Defⁿ soil colloids → The soil colloid is a material made up of organic or inorganic particles less than 0.001 mm diameter.

* Types of soil colloids →



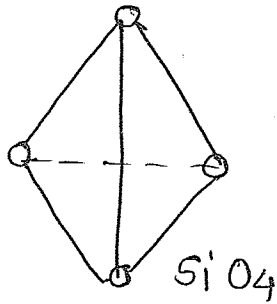
I] Inorganic Soil Colloid →

① Layer silicate clay -

- i) It is a crystalline Nature
- ii) It is a layer like structure
means leaf & platelet like structure.
- iii) It is mostly present in temperate & tropical area
- iv) Divided into two Horizontal sheet.
 - a) Dominated by Silicon (Si^{4+})
- Tetrahedron
 - b) Dominated by Al^{3+} & Mg^{2+}
- Octahedron.

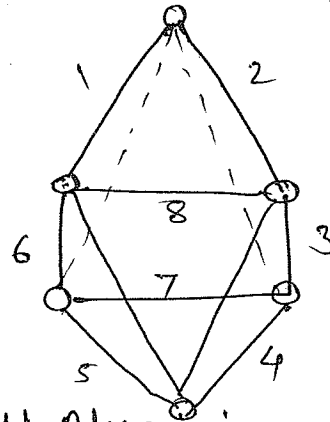
Tetrahedron & octahedron.

④ Tetrahedron



- i) one Silicon atom surrounded by 4 oxygen atom
- ii) four Sided configuration
- iii) silica tetrahedra tie together by oxygen anion to form tetrahedral sheet.

⑤ Octahedron



- i) Aluminium atom surrounded by six oxygen or OH group
- ii) It gives eight sided configuration
- iii) octahedra linked together horizontally to form octahedral sheet.

Q11] Define Mineral. classify the minerals. Based on Mode of origin

⇒ Defn Mineral → Mineral are Naturally occurring in inorganic solids, homogeneous substance composed of atoms having an already on a regular arrangement with definite chemical composition.

* Classification of Minerals -

- A] Based on mode of origin (formation) -
- B] Based on Quantity -
- C] Based on specific Gravity -
- D] Based on chemical Composition -

[A] Based on mode of origin →

i) primary minerals → It formed from crystallization of magma.

- It is original component of Rocks.

- e.g ① Quartz
② Feldspar
③ Mica.

ii) Secondary minerals →

— It formed due to alteration of primary minerals.

- e.g ① Quartz
② clay (kaolinite)
③ Calcite
④ Serpentine

Q12] Give the Thermal properties of soil.

→ Thermal properties of soil →

- (1) specific Heat —
- (2) Heat Capacity —
- (3) Thermal Conductivity —
- (4) Thermal diffusivity —

[1] specific Heat →

— It may be defined as the amount of Heat required to raise the temp of 1 gm. of subs by 1°C.

— It is expressed in cal/gm

— The specific heat of dry soil (0.2 cal/gm)

— moist soils are cooler due to their High specific Heat. also due to the Heat energy spent in evaporation of soil moisture.

specific Heat of water — 1 cal/gm

O.M — 0.462

clay — 0.22

Air — 24

Humus — 0.4

Φ

[2] Heat capacity →

— The Heat capacity of soil is the quantity of heat required to raise the temp of unit volume of soil by 1°C is called as "Heat capacity"

It expressed as $\text{cal}/\text{cm}^3^{\circ}\text{C}$.

— The Heat capacity of a given material is equal to its specific Heat multiplied by mass.

— Heat capacity = specific Heat \times Density

$$0.11 = .462 \times 1.3$$

$$= .60 \text{ cal}/\text{cm}^3^{\circ}\text{C}$$

[3] Thermal conductivity →

— The Thermal conductivity of soil is defined as the quantity of heat passing in a unit time.

— It expressed as $\text{cal}/\text{cm}/^{\circ}\text{C}$.

— In general, the thermal conductivity of soil varies.

— The Flow of temp in soil is expressed as "Thermal conductivity". It increases with water content & decrease with porosity.

[4] Thermal diffusivity →

— It is defined as the Ratio of thermal conductivity of Heat capacity

$$\alpha = k/cv \quad \text{unit } \text{cm}^2/\text{s}.$$

— The Thermal diffusivity is a measure of the rate at which changes in temp occur in the body.

Q13 Importance of soil Water and It's Factor affecting soil Water.

⇒ * Importance of soil Water →

- (1) serves as a solvent and carrier of food Nutrient for the growth ~~and~~ of plants.
- (2) crop if itself acts as nutrient.
- (3) crop production depends almost entirely on the amount of water present in a soil.
- (4) To Regulate temprature
- (5) Microorganism required water for their Metabolic Activity
- (6) Help in chemical and biological activities of soil and plants.
- (7) principle constituent of the growing plant
- (8) Essential For photosynthesis.
- (9) It is Important in weathering process.
- (10) It is constituent of living system. without water no life.

* Factor affecting soil Water →

- (1) Texture → fine texture soil, more is the pore space i.e more retention of water.
- (2) Structure → Well aggregated porous structure increase the water retention in soil.

(3) Organic-matter → High organic matter more is the water retention in soil

(4) Density of soil → Higher bulk Density of soil, lower is the water content

(5) Temperature → cooler the temperature. higher is the moisture retention.

(6) Salt Content → More the salt content in the soil, less is the water available to plant.

(7) Depth of soil → More the depth of soil, more is the water available to the plant.

(8) Type of clay → The 2:1 type of clay increases the water retention in the soil.

Q 13 Give the composition of plant residues and explain role of organic matter in of soil properties

⇒ * Composition of plant Residues →

(1) Moisture content of green plant tissue varies from 60 to 90 percent with an average 75 percent.

(2) The dry matter is mostly carbon and oxygen with less than 10 percent.

(3) organic forms of essential Nutrient such as nitrogen phosphorus, potassium calcium & sulphur.

(4) If soil porosity is reduced below 10-12%, soil oxygen

(5) Root required at least 3% oxygen in soil air

<u>Compound</u>	<u>percentage</u>
(1) <u>carbohydrates</u>	— 0
(2) <u>Sugars</u>	— 1 to 5
(3) <u>Cellulose</u>	— 20 to 50
(4) <u>Hemicellulose</u>	— 10 to 28
(5) <u>proteins</u>	— 1 to 15
(6) <u>Fat, oils, waxes, tannins</u>	— 1 to 8
(7) <u>Lignin's</u>	— 10 to 30.

* organic matter →

— organic matter addition and cropping increase the level of CO_2 in soil Air.

— carbon dioxide production being product of Biological activities.

Q14 | Various forms of soil water and explain brief field capacity of soil.

⇒ Forms of soil water ⇒

- (1) Field capacity
- (2) permanent wilting point
- (3) Available water capacity
- (4) maximum holding capacity
- (5) moisture equivalents.
- (6) sticky point moisture.

(1) Field capacity → After application of water in the soil, all the gravitational water has drained out, the amount of water held by the soil at this stage is called Field capacity

- It is capacity of the soil to retain water against force of gravity
- The Amount of moisture held of Field capacity is available to plant.

(2) permenant wilting point / wilting coefficient →
 - the percentage of water held by the soil at wilting point is called as permenant wilting point.

(3) Available Water capacity →

- The amount of water required to apply to a soil at the wilting point to reach the Field capacity is called available water.
- The water supplying power of soils is related to the amount of available water a soil can hold.

(4) Maximum Holding capacity →

- It is also known as maximum retentive capacity
- soil moisture tention is very low.
 $1/100^{\text{th}}$ to $1/1000^{\text{th}}$ of an atmosphere
 or pf 1 to 0.

(5) Sticky point moisture →

- It represent the moisture content of soil at which it no longer sticks to a foreign object.
- It is moisture content at which it no longer stick to foregn object
 A stage at which soil remains friable.

Q15] What is soil organic matter & explain composition / factor of soil organic matter.



Soil organic matter

Soil organic matter is the organic fractions of the soil including plants, animal & microbial residues.

* Composition / Factor soil organic matter -

- (1) climate -
- (2) Vegetation -
- (3) Texture -
- (4) Drainage -
- (5) Cropping pattern -
- (6) plant residues -
- (7) Soil management -

1] climate →

- As one moves from a warmer to cool climate the organic matter and nitrogen content of soil tend to increase.

2] Drainage →

- The poorly drained soils, because of their high moisture relations and relatively poor aeration are generally much higher in organic matter and the nitrogen than of better drained equivalent.

Q16

(3) Vegetation →

- Total organic matter is higher under grassland than those under forest

(4) Cropping pattern →

- cropped land has lower organic matter than the ~~wet drained soil~~.
the uncropped area

Q16 Define soil Biology & Role of soil microorganism

⇒ * Soil Biology →

The study of the effect of plants animal and soil microorganism on the evolution chemical composition and physical condition of the soil.

* Role of soil microorganisms :-

(i) Conservation of organic Nitrogenous compound.

(ii) Hydrolytic decomposition of proteins released amine & Amino Acids

(iii) Fungi - in acidic condition.

(iv) It takes place three steps.

a) Aminization — Complex organic compound by enzymic digestion to convert Amino Acid is called "Aminization"

b) Ammonification → The change of organic nitrogenous compound into Ammonia is called ammonification

8) Nitrification → The conversion of ammonia to Nitrate (NO_3) is called as nitrification.

- Autotrophic bacteria involved in this transformation.

(v) The Ammonizing microbes includes both anaerobic population.

Q17 Define soil & Describe the structure of Earth.

⇒ defⁿ [soil] →

soil may be defined as a dynamic natural body on the surface of the earth in which plant grow composed mineral, organic material.

* Earth consist of →

- (1) Atmosphere -
- (2) Hydrosphere -
- (3) Lithosphere -
- (4) Biosphere -

(1) Atmosphere →

- It is outermost layer of earth. It extends from surface of the earth of about 320 km.
- It is lighter than Hydrosphere.
- It consist of mixture of gasses.
- e.g N, O, C

Composition of Atmosphere

- | | | | |
|---------------------------|---|-------|---|
| (1) <u>Nitrogen</u> | - | 78.0% | } |
| (2) <u>oxygen</u> | - | 21.0% | |
| (3) <u>carbon dioxide</u> | - | 0.03% | |
| (4) <u>other gasses</u> | - | 0.97% | |

The atmosphere contributes 0.03% by weight of earth.

(2) Hydrosphere →

- It is layer of water surrounding the lithosphere.
- It present in the form of sea & oceans
- It occupies nearly 70% of the surface of earth.

(3) Biosphere →

- The portion of the lithosphere which rise above the sea water is visible to us and which is known as 'Land'.
- The biosphere consist of living organism like man, animal, micro-organism.

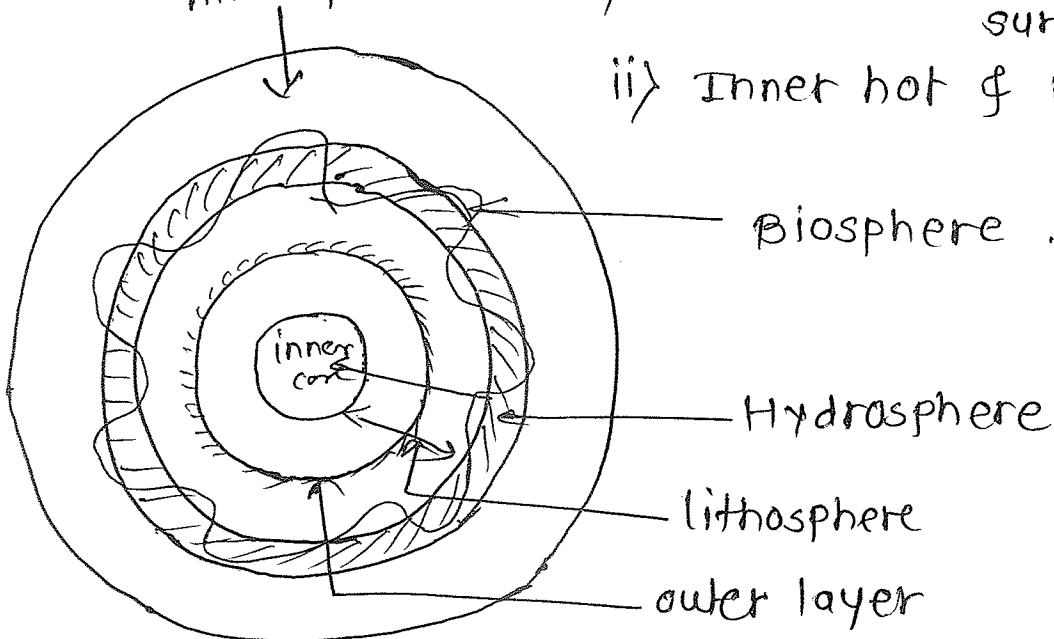
(4) Lithosphere →

- It is the inner most body within the gaseous & water envelope.
- It consist two portion.

Atmosphere.

i) The upper cooled solid surface

ii) Inner hot & molten mass.



* Composition of Earth crust →

<u>Element</u>	<u>Mineral</u>
(1) <u>O</u> → 47.02 %	(1) <u>Fieldspar</u> → 58 %
(2) <u>Si</u> → 28.06 %	(2) <u>Hornblend</u> → 15 %
(3) <u>Al</u> → 8.16 %	(3) <u>Quartz</u> → 13 %
(4) <u>Fe</u> → 4.84 %	(4) <u>Mica</u> → 4 %
(5) <u>Ca</u> → 3.50 %	(5) <u>clay</u> → 1 %

Q18] physical properties of soils.

⇒ physical properties of soils.

- (1) soil texture →
- (2) soil structure →
- (3) surface area →
- (4) soil density →
- (5) soil porosity →
- (6) soil colour →
- (7) soil consistence →
- (8) soil Air →
- (9) soil water →

(1) soil texture →

- soil texture refers to the relative proportion of particles or separates of various sizes in a given soil. the relative percentage of sand silt and clay in a soil.

(2) soil structure → The arrangement and organization of primary and secondary particles in soil mass known as soil structure.

(3) Surface Area →

- specific surface of soil is defined as the amount of surface area per unit weight or volume of soil and expressed in m^2/g .

(4) Soil Density →

- soil density is expressed in two well accepted concepts as particle density and bulk density.

(5) Soil Porosity →

- The volume of soil mass that is not occupied by soil particles is known pore space;
- volume of pore space in soil is very important factor

(6) Soil Consistence →

- soil consistence is a term used to describe the resistance of a soil at various moisture content to mechanical stresses or manipulation.



Q19] Importance of soil texture in Agriculture

⇒ * Importance of soil texture -

(1) Stone & Gravel →

- i) Gravel have size 2 to 75 mm
- ii) They are not much ~~in~~ significant.

(2) Sandy →

- i) soil are of open character, usually loose and friable.
- ii) Facilitated Drainage and circulation water
- iii) sandy soil soils have very little water Holding capacity.
- iv) In sandy soil few crop groundnut, cucumber, potato etc.

(3) clay →

- i) partical play a very important role in soil fertility.
- ii) They Have fine pores, and are poor drainage and aeration.
- iii) They Have High water Holding capacity and poor water percolation
- iv) They are generally very fertile soils in respect of plant nutrient content.
- v) Rice, Jute, sugarcane can grown very successful.

(4) Silt →

- i) Is a very valuable constituent of soil.

- ii) Good loamy soil contain about 30 to 50 percent silt.
- iii) They are intermediate between sandy soils and clay soils.
- iv) In loam soil good tilth is obtained easily.
- v) They are partially suited to every kind of crop such as wheat, maize, Rice, sugarcane etc.

Q20 The General properties of soil colloids

⇒ Properties →

- (1) Brownian movement —
- (2) Electrical charge —
- (3) Non permeability —
- (4) Dispersion & flocculation —
- (5) size —
- (6) surface Area —
- (7) cohesion & Adhesion —
- (8) plasticity —
- (9) Adsorption —
- (10) swelling & shrinkage —

(1) Brownian movement →

- colloidal particles are to be ~~contin~~ continue motion by oscillation.
- This movement is mainly responsible for the flocculation.
- The smaller the particle more rapid movements

(2) Electrical charges →

- colloidal particles often have some positive & some -ve electrical charge.

(3) Non permeability →

- colloids, are unable to pass through a semipermeable membrane.

(4) size →

- They are seen taking their photograph with electron microscope.
- colloid particle size is less than 0.001 mm in diameter.

(5) Surface Area →

- colloids very small in size expose large external surface area.

(6) Cohesion & Adhesion →

i) Cohesion → The tendency of clay particles to stick together that are similar in nature.

ii) Adhesion - The tendency of colloidal particle sticking to other sub e.g water.

- Hydrogen bonding betⁿ clay surface & water responsible for adhesion.

(7) plasticity →

- soil containing more than 15% clay exhibit plasticity
- plasticity is due to plate-like clay particles

Q21] Explain the significance of soil pH

→ significance of soil pH

(i) In Neutral soils -

- Most plant perform well
some plants species required
Acid or alkaline reaction
legumes neutral to slightly
alkaline soil

(ii) Nutrient availability in soil depend on
its pH -

At low pH, Al, Fe, Mn are more
soluble and available more so
that they may prove to be toxic
to plants availability of Mo, Co, P
decreased.

(iii) Influence activity of microorganism
which in turn influence decomposition
process of organic matter and availability
of Nutrients.

(iv) Influence is need for Fertilizer

(v) Influence soil of the structure

Q22] Define soil aggregate. Factor affecting of soil aggregate and importance.

→ * Soil aggregate

The primary soil particle e.g sand, silt, clay, are grouped together to form secondary particles is called aggregate.

(OR)

primary soil particle, in presence of clay tend to under natural condition to form secondary particles is called soil aggregate.

* Factor affecting soil aggregate. →

- (1) physical process —
- (2) organic matter —
- (3) Adsorbed cations —
- (4) Tillage & compaction —

(1) physical process →

- Alternate of drying will increase aggregation in soil.

(2) organic matter →

At the time of decomposition of organic matter produce gel & other viscous microbial product. It will develop granular aggregation in soil.

(3) Adsorbed cations — Aggregate formation is definitely influenced by the nature of the cations adsorbed by soil colloid.

(4) Tillage & compaction →

- Tillage has both Favourable & unfavourable effect on aggregation

* IMPORTANCE *

- (1) Formation of aggregate increase pore space -
- The pore space are controlling water & temp. in soil which is given by plant growth
- (2) The effect of soil aggregation on plant growth for the emergence seedling in seed bed.
- (3) Aggregate formation determine the suitability of soil to cultivation
- (4) Aggregation increase the micro-organism activity in soil

Q 23] Define soil Erosion. Enlist the types of Water Erosion and Explain any one.

⇒ Defⁿ soil Erosion →

It is detachment and transportation of soil from one place to another by the action of Wind.

(OR)

Soil Erosion is the removal of part of the soil or the whole soil, by the action of win or water.

* Types of Water Erosion → / classification:

- (1) splash Erosion —
- (2) sheet Erosion —
- (3) Rill Erosion —
- (4) Gully Erosion —
- (5) slip Erosion —
- (6) stream Bank Erosion —
- (7) Sea shore Erosion —

(1) splash Erosion →

- The soils most readily detached by raindrop splash erosion are fine sands and silts.
- Most soils of finer texture, such as clays and clay loams, are not readily detached because of the strong forces of cohesion aggregated.
- When they are very wet or filled excessively with only meager additions of organic matter.

Q 24] Define soil aeration. Factor affecting of soil aeration & Give its Importance.

⇒ defⁿ soil aeration →

The constant movement of air in the soil mass resulting in the renewal of gases is called "soil aeration"

* Factor affecting soil aeration →

- (1) Nature & condition of soil
- (2) Type of crop
- (3) Microbial activity
- (4) Seasonal variation

(1) Nature & condition of soil →

- Quantity of O_2 is less in soil air than atmospheric air
- It depends upon the depth of soil
 - surface layer - O_2 is Higher
 - lower layer - O_2 is lower

(2) Type of crop →

- plant root required O_2 which they take from soil air.
- reduced the concentration of O_2 in soil air.
- cropped soil contain more CO_2 conc. than fallow land.

(3) Microbial activity →

- The micro-organism in soil require O_2 & they take from soil air.
- decomposition of organic matter.

(4) Seasonal variation →

- The quantity of O_2 is usually Higher in dry season than rainy season
- High temp during summer season increase micro-organism activity, result higher prodⁿ.

* Importance of soil air on plant growth →

- (1) plant & root growth →
- (2) Microbial population & activity →
- (3) production of toxic substance →
- (4) Water & Nutrient absorption →
- (5) development of plant disease →

Q 25] Define Humus & properties of Humus & Function

⇒ Defⁿ Humus → ~~It is a complex & resistant mixture~~

It is a complex & rather resistant mixture of dark brown amorphous colloidal organic subs ~~from microbial~~ are developed from microbial decomposition & synthesis.

* Properties & function →

- The tiny colloidal Humus particles are composed of C-55%, H-5%, O-35%, N-5%.
- The surface area of Humus is very high than the silicate clay.
- The colloidal surface of Humus are -ve charged.
- The CEC of Humus is 150-300 meq/100g is more than silicate clay
- The water holding capacity of Humus is 4 to 5 times more than silicate clay
- Humus is good effect on aggregate formation
- Humus has dark brown in colour
- It has amorphous in nature.

Q26] Define soil separates. classification of soil separates.

⇒ Defn. Soil separates →

- According to size of the soil particles are grouped. is called soil separates.

* classification of soil separates →

Soil separate	Diameter
① clay	less than 0.002
② silt	0.002 to 0.02
③ fine sand	0.02 to 0.2
④ coarse sand	0.2 to 2
⑤ Gravel	More than 2 mm.

	0.002	0.006	0.02	0.06	0.2	0.6	2.0			
British standard → clay Institution	fine		medium	coarse	fine	medium	coarse	Gravel		
	silt			sand						
International society of clay soil science.	silt			sand			Gravel			
				fine		coarse				
	0.002		0.2		2		2.0			
United states Department of Agriculture	0.002	silt			very fine	fine	medium	coarse	very coarse	Gravel
						sand				
United State public Roads clay Administration		silt			sand.				Gravel	
					fine		coarse			
	0.005		0.05		0.25		2.0			