Solution

DPP -7

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1. In a framework silicate, known as a tectosilicate, each tetrahedron shares all 4 oxygen atoms with its neighbours, forming a 3D structure.

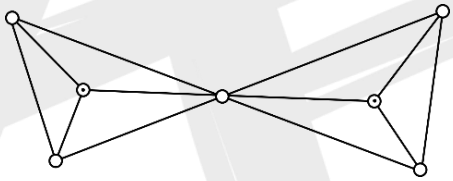
2. × zeolite } 3D-shect structure

× Asbestos} Double chain silicate

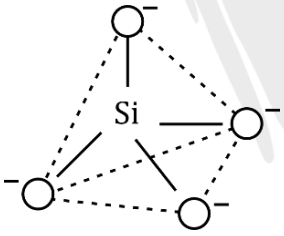
✓ Emerald} cyclic structure Si6 O1812 Units, 1-2% Cr [Green colour]

× Tale} 2D-shect structure

3. Pyrosilicates are silicates which contain $Si_2O_7^{6-}$. They are formed by joining two tetrahedral $Si_2O_4^{4-}$. When two $Si_2O_4^{4-}$ are joined, there is removal of one oxygen atom and the two units join at the corner oxygen atom. Example is thortveitite, $Sc_2Si_2O_7$. The structure of pyrosilicate is:



4. Quartz, mica and asbestos are different type of silicates but all these share common basic unit, SiO_4^{4-}.



Such tetrahedral units (SiO_4^{4-}) are linked together in different ways to give, chains, rings, sheets and three-dimensional network.

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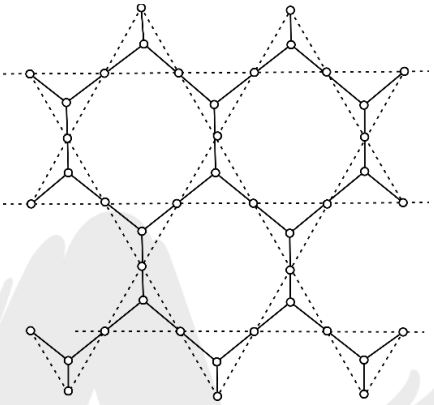
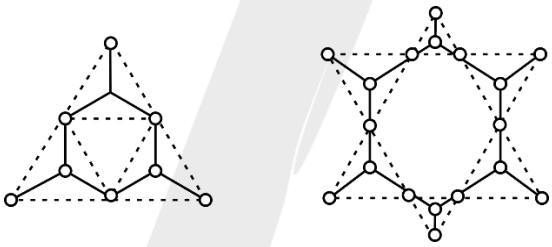
5. Correct option is (D)

It can be seen from figure that three oxygen of a SiO_4^{4-} tetrahedron is shared with another SiO_4^{4-} tetrahedron

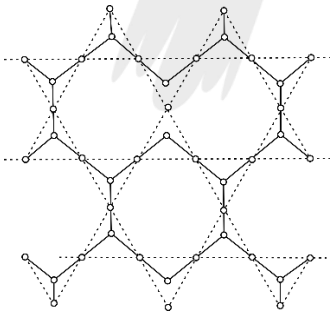


6. Correct option is (A)

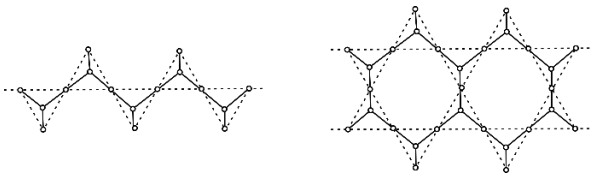
The general formula of Sheet or Phyllo silicates is $(Si_2O_5)_n^{2n-}$. Each SiO_4 tetrahedron shares three oxygen atoms with others and thus by forming two-dimensional sheets and only one monovalent oxygen is left



Cyclic structure



Two dimensional sheet silicates



Chain silicaties

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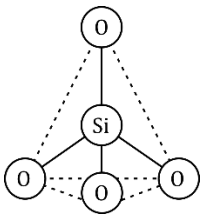
7. Anorthite, CaAl2Si2O8, is classified as a plagioclase group feldspar tectosilicate, with 45 to 50% of the Si4+ in the tetrahedra framework substituted by Al3+. This large charge deficit is balanced mainly by the addition of Ca to the feldspar structure.

8.



(A) in silicate, only oxygen atom are shared so edge is never shared

(B) aluminosilicates having three dimensional network. They are termed aluminosilicates because, some of the Si4+ ions may be replaced by Al3+.

(C) As shown in above structure that si+4 occupy tetrahedral holes.

(D) In a silicon–oxygen bond, electrons are shared unequally between the two atoms, with oxygen taking the larger share due to its greater electronegativity. This polarisation means Si–O bonds show characteristics of both covalent and ionic bonds.

9. (1) The double chain silicates can be drawn in which two simple chains are joined together by shared oxygen. Such compounds are also known as amphiboles.
(2) If two oxygen atoms per tetrahedron are shared to from closed rings such that the structure with general formula $(SiO_3^{2-})_n$ or $(SiO_3)_n^{2n-}$ is obtained, the silicates containing these anions are called cyclic silicates.
(3) Orthosilicates contain discrete $[SiO_4]^{4-}$ units i.e. there is no sharing of corners with one another.

(4) asbestos is non combustible fibrous silicate and it is a type of double chain silicate Mica is a mineral name given to a group of minerals that are physically and chemically similar. They are all silicate minerals, known as sheet silicates because they form in distinct layers.

10. (A) Pyro silicate (or Soro silicate or disilicate) contain $Si_2O_7^{\ 6-}$ ions which are formed by joining two tetrahedral siO $4^{4\ 4}$ which share one oxygen atom at one correr (one oxygen is removed while joining hence Thortveitite $-5c_2Si_2O_7$

(B) The general formula of Sheet or Phyllo or two dimensional $(2-D)$ silicates is $(S_2O_5)_n^{2n}$, Each SiOs tetrahedron shares three oxygen atoms with others and thus by forming two-dimensional sheets. These silicates can be cleaved easily just like graphite. The layers are held together by weak van der Waal's force hence Kaolinite Al2(OH)4 [Si2O5]

(C) The general formula of double chain silicates (or Amphiboles) is $(Si_4O_{11})_n^{\ 6n-}$. There are two types of tetrahedra: those sharing 3 vertices and those sharing only 2 vertices hence Na2(Fe2+3Fe3+2)Si8O22(OH)2

(D) Ortho silicates (or Neso or Island silicates) are the simplest silicates which contain discrete $SiO_4^{\ 4-}$ tetrahedral units hence Phenacite Be2 [SiO4]