

SHORT QUESTIONS

Q.1 What is the action of an aqueous solution of borax on litmus?

Ans. Red litmus becomes blue in aqueous solution of borax. Borax hydrolysis changes to alkali and weak acid (ortho-boric acid).



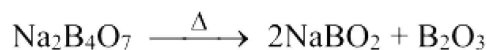
Q.2 Why the aluminum vessels are not washed with alkalis?

Ans. Dilute solution of alkalis react with aluminum to form sodium aluminate and hydrogen, so aluminum vessels are not washed with alkalis.



Q.3 What is effect of heat on borax?

Ans. Borax on heating loses its water of crystallization and swells up into a white porous mass due to expulsion of water. On further heating it melts into a clear transparent glassy mass.

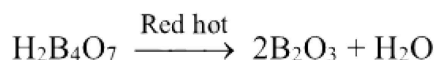
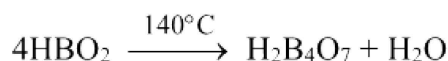
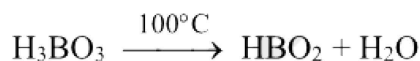


Q.4 How borax bead test is performed?

Ans. Prepare a loop of platinum wire. Heat the loop on flame and touch it with borax powder. Some powder will melt and adhere with the loop. Now heat the borax upto glassy mass. Put some crystals of substance, which is under examination on the loop, and heat it again. Observe the colour of bead on oxidising and reducing flame.

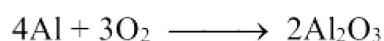
Q.5 What is effect of heat on orthoboric acid?

Ans. Orthoboric acid on heating changes to metaboric acid, which on further heating, changes to tetraboric acid. Tetraboric acid on strong heating changes to boric anhydride.



Q.6 How aluminum metal is used to remove air bubbles from molten metals or molten iron?

Ans. At high temperature some aluminum is added to the molten metals. Al reacts with N_2 and O_2 of air to form AlN and Al_2O_3 respectively and air bubbles are removed.

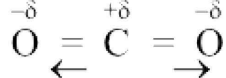


Q.7 Write down two similar behaviours in carbon and silicon.

Ans. (i) Both C and Si have catenation or chain formation properties.
(ii) Oxides of both C and Si are acidic in nature.

Q.8 Why CO_2 molecule is non-polar in nature?

Ans. CO_2 molecule has linear structure.



Polarity of the molecule is cancelled out because two vectors are in opposite direction with same magnitude. Its dipole moment is zero.

Q.9 CO₂ is gas while SiO₂ is solid, although both are oxides of group IV-A.

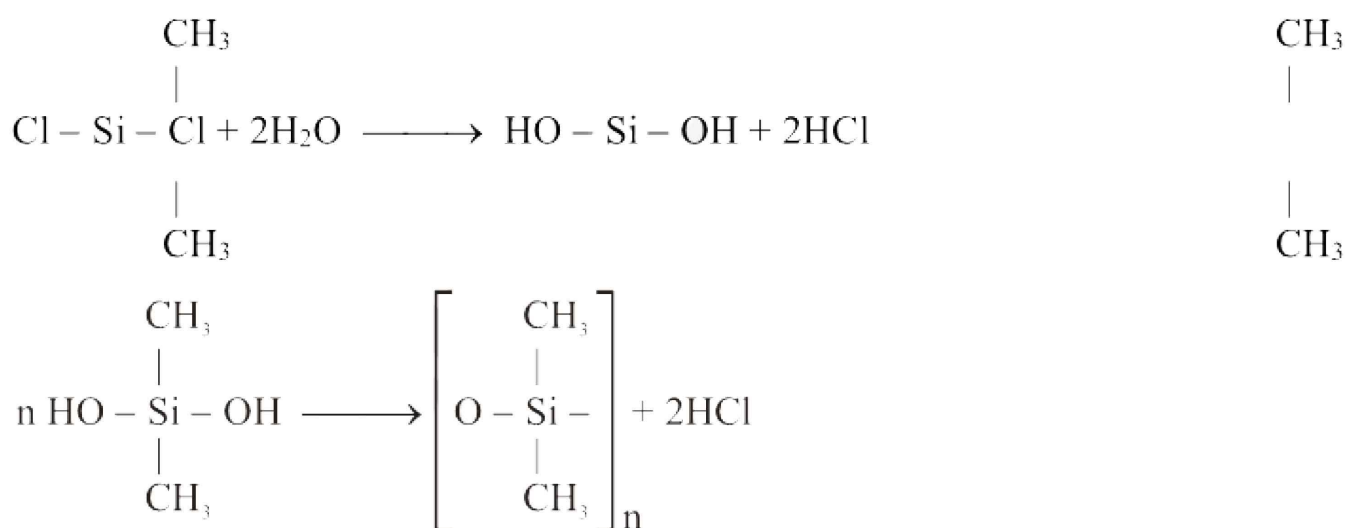
Ans. CO₂ molecule has independent existence and has weak intermolecular forces in them. SiO₂ is not an independent molecule. SiO₂ has network covalent structure. It is giant molecule or macromolecule. In SiO₂ each silicon atom is linked with four oxygen atoms and one oxygen is linked with two silicon atoms.

Q.10 What is chemical garden?

Ans. When crystals of coloured salts like NiSO₄, FeSO₄, CuSO₄, Co(NO₃)₂ etc., are placed in the solution of sodium silicate, they produce a very beautiful growth, like plants, which is called chemical garden.

Q.11 What are silicones?

Ans. Silicon are inorganic polymers. Silicones are formed by the hydrolysis of (CH₃)₂SiCl₂ and then dehydration of that hydrolytic product.



Q.12 Silicones are better lubricants as compared to petroleum oil, why?

Ans. In silicones, very small change in viscosity takes place by changing temperature as compared to mobile oil. If the temperature is dropped from 100°C – 0°C the viscosity of petroleum oil may increase about one hundred fold, whereas that of silicon oil will increase less than four folds. At high temperature, silicones do not react with air oxygen and remains free from acids, petroleum oil cannot be used at high temperature due to air oxidation and cracking of the molecules.

Q.13 How does borax serve as a water-softening agent?

Ans. Borax can be used to remove Ca⁺² ions and Mg⁺² ions from hard water. These ions react with borax and settle down as precipitates.

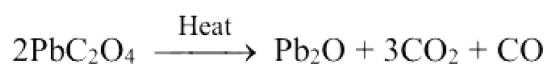


Q.14 Write the formula of the ores of the elements of Gr III-A and IV-A.

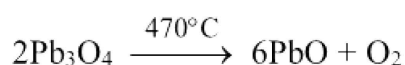
Ans. Tincal (borax)	$\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$
Colemanite	$\text{Ca}_2\text{B}_6\text{O}_{11} \cdot 5\text{H}_2\text{O}$
Orthoboric acid	H_3BO_3
Feldspar	$\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$
Mica (muscovite)	$\text{KH}_2\text{Al}_3(\text{SiO}_4)_3$
Kaolin (clay)	$\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$
Corrundum	Al_2O_3
Emerald	$\text{Al}_2\text{F}_2\text{SiO}_4$
Gibbsite	$\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$
Bauxite	$\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$
Diaspore	$\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$
Cryolite	Na_3AlF_6
Limestone	CaCO_3
Dolomite	$\text{CaCO}_3 \cdot \text{MgCO}_3$
Magnesite	MgCO_3
Analcite	$\text{NaAl}(\text{SiO}_3)_2 \cdot \text{H}_2\text{O}$
Asbestos	$\text{CaMg}_3\text{Si}_4\text{O}_{12} / \text{CaMg}_3(\text{SiO}_3)_4$
Talc / Soapstone	$\text{H}_2\text{Mg}_3\text{Si}_4\text{O}_{12} / \text{H}_2\text{Mg}_3(\text{SiO}_3)_4$
Zircon	ZrSiO_4

Q.15 What is the effect of heat on the following?

Ans. (i) Lead oxalate:

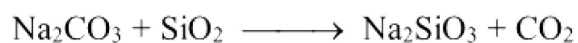


(ii) Red lead:

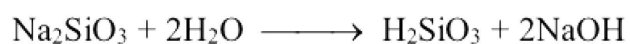


Q.16 What is sodium silicate? Give its uses.

Ans. It is sodium salt of metasilicic acid H_2SiO_3 . It is also called “water glass”. It is prepared by fusing sodium carbonate with pure sand. This process is carried in the reverberatory furnace.



It is soluble in water and the solution is strongly alkline due to hydrolysis.



Uses of Na_2SiO_3 :

(i) It is used as filler in soap industry.

- (ii) It is used in textile as fire proof.
- (iii) It is used in furniture polish.
- (iv) It is used in calico printing.

Q.17 What are the properties of vitreous silica (silica glass)?

Ans. Vitreous silica has the following properties:

- (i) High transparency to light.
- (ii) Very refractory (heat resistant).
- (iii) It does not soften below 1500 – 1600°C.
- (iv) It has very low thermal expansion.
- (v) It is excellent insulator.
- (vi) It is hard, brittle and elastic.
- (vii) It is insoluble in water.
- (viii) It is resistant towards all acids except HF.



Q.18 What are the uses of Borax?

- Ans.**
- (i) It is used to prepare borate glass which is heat resistant.
 - (ii) It is used in softening of water.
 - (iii) It is used in the borax bead test.
 - (iv) It is used in the metallurgical operations.
 - (v) It is used as flux in welding.
 - (vi) It is used in making washing powders.
 - (vii) It is used in the leather industry for tanning and dyeing.
 - (viii) It is used in cosmetics, medicine, paints, textile industry.
 - (ix) It is used in the match industry.
 - (x) It is used as preservative.

Q.19 What are semi-conductors?

Ans. A semi-conductor is a substance that has different resistance to the passage of electric current under different circumstances.

They include elements like Ge, Se, Si and compounds and like ZnS, SiC, CdS, AlP, GaP, GaAs, InAs, InSb. Semi-conductors are also called half conductors. They are better conductor than insulators and less conductors than metals. Their conductivity increases with increase of temperature. They are used in making transistors which are used in television, computers, radios and calculators.