CBSE Class 11 Chemistry

Important Questions

Chapter 11

The p-Block Elements

1 Marks Questions

1.How many groups are there in p-block?

Ans. There are six groups of p-block elements in the periodic table numbering from 13 to 18.

2.What is 'inert pair effect'?

Ans. The occurrence of oxidation states two unit less than the group oxidation states are sometimes attributed to the 'inert pair effect'.

3.How does metallic and non-metallic character vary in a group?

Ans. The non-metals and the metals exist only in the p-block of the periodic table. The non-metallic character of elements decreases down the group. In fact the heaviest element in each p-black group is the most metallic in nature.

4.Why do third – period elements expand their covalence above four?

Ans. The third – period elements of p-groups included d-orbital, which can be utilized to form bond and expand octet.

5.Why do heaver elements form π – bonds?

Ans. The heavier elements of p-block elements forms π – bonds because of the combined effect of size and availability of d-orbital's considerably influences the ability of there elements to form π – bonds.

6.Where does metalloids and non – metals exist?

Ans. It is interesting to note that the non-metals and metalloids exist only in the p-block of the periodic labels.

7.Give the chemical formula of inorganic benzene.

Ans. $B_3N_3H_6$ Borazine

8.Give two examples of electron deficient molecules.

Ans. BF_3, B_2H_6.

9.Arrange the following halides of boron in the increasing order of acidic character: BF_3, BCl_3, BBr_3, BI_3.

Ans. $BF_3 < BCl_3 < BBr_3 < BI_3$.

10.Why is boric acid considered as a weak acid?

Ans. Boric acid is not able to release H^+ ions on its own. It receive OH^- ions from water molecules to complete its octet and in turn release H^+ ions.

11.Why is boron metalloid?

Ans. Because, boron resembles both with metals and non-metals, therefore boron is metalloid.

12.Why do boron have unusual high melting point?

Ans. Due to very strong crystalline lattice, boron has unusually high melting point.

13.Why does BF_3 act as Lewis acids?

Ans. Boron in its halides has only six electrons in its valence shell. Therefore, it can accept a pair of electrons from any electron-rich molecule. Therefore, it acts as an electron – acceptor

and called Lewis acid.

14.What is the electronic configuration of Group -14 elements?

Ans. The electronic configuration is ns^2np^2.

15.Name the metalloid found in Group 14 element?

Ans. Germanium is a metalloid found in group – 14.

16.Which of the following reacts with water and aqueous solution becomes acidic: $SiCl_4$ or CCl_4?

Ans. Si Cl_4.

17.Why CCl_4 behaves as an electron precise molecule?

Ans. Carbon in CCl_4, the number of electrons around the central atom in a molecule is eight and thus is electron precise molecule.

18.Why is lead unaffected by water?

Ans. Lead is unaffected by water, probable because of a protective oxide film formation.

19.What is the common name of recently developed allotrope of carbon i.e. C_{60} molecule?s

Ans. Fullerene.

20.How are fullerenes obtained?

Ans. Fullerenes are made by the heating of graphite in an electric arc in the presence of inert gases such as helium or argon.

21.Diamond is the hardest substance known. Why?

Ans. Diamond is the hardest substance on the earth because it is very difficult to break extended covalent bonding.

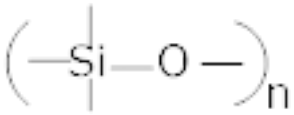
22.What is water gas?

Ans. The mixture of CO and H_2 is known as water gas or synthesis gas.

23.Silicon dioxide is treated with hydrogen fluoride. Explain?

Ans. $SiO_2 + 4HF \rightarrow SiF_4 + 2H_2O$

24.What are silicones?

Ans. Simple silicones consists of  chains in which alkalyl or phenyl groups

occupy the remaining bonding position on each silicon. They are hydrophobic in nature.

25.What is dry ice?

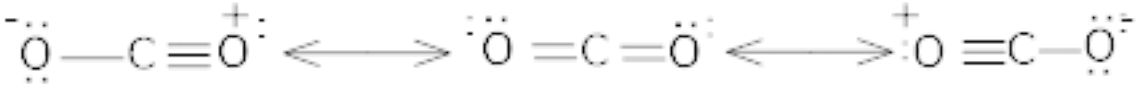
Ans. Solid CO_2 is known as dry ice.

26.What are silicates?

Ans. The structural unit of silicates is SiO_4^{4-} in which silicon atom is bonded to four oxygen atoms in tetrahedron fashion.

27.Write the resonance structures of carbon dioxide.

Ans.



Resonance structures of carbon dioxide.

28.What is silica-gel used as?

Ans. Silica gel is used as a drying agent and as a support for chromato graphic materials and catalysts.

CBSE Class 12 Chemistry
Important Questions
Chapter 11
The p-Block Elements

2 Marks Questions

1.Why the elements of group 13 are called p-block elements?

Ans. Group 13 elements are called p-block elements because the last electron is present in the p-orbital (np^1). The valence shell configurations are B ($2s^2$ $2p^1$), Al ($3s^2$, $3p^1$), Ga ($4s^2$, $4p^1$), In ($5s^2$ $5p^1$) Tl ($6s^2$ $6p^1$)

2.The elements B, Al, Ca, In and Tl are placed in the same group of the periodic table. Give reason.

Ans. The elements B, Al, Ga, In and Tl are placed in the same group of the periodic table because each one has the same number of electrons (ns^2 np^1) in its valance shell.

3.Aluminium forms $[AlF_6]^{3-}$ $whereas$ $[BF_6]^{3-}$ **in not formed why?**

Ans. Due to presence of vacant d-orbital's, Al can expand its octet to form bonds with six fluoride ions whereas B cannot. Boron does not have d-orbital's.

4.The atomic radius of Ca is less than that of Al. Why?

Ans. This is due to the variation in the inner core of the electronic configuration. The presence of additional 10 d-electrons offer only poor screening effect for the outer electrons from the increased nuclear charge in gallium.

5.C and S are always tetravalent but Ge, Sn And Pb show divalency. Why?

Ans. Inert pair is more prominent as we move down the group in p – block elements. Ge, Sn

and Pb show divalency due to inert pair effect.

6.Some halides of group 14 elements form complexes of the type $[MX_6]^{2-}$. Give reason.

Ans. The halides of the elements having vacant d-orbital's can form complexes like $[SiF_6]^{2-}$ and $[SnCl_6]^{2-}$, because in such a case the central atom can increase its coordination number from 4 to 6 due to availability of vacant d–orbital's.

7.$[SiF_6]^{2-}$ is lead known whereas $[SiCl_6]^{2-}$ not. Give reason.

Ans. The main reasons are that

(i) Six large chloride ions cannot be accommodated around Si^{4+} due to limitation of its size.

(ii) Interaction between lone pair of chloride ion and Si^{4+} is not very strong.

8.PbI_4 does not exist. Why?

Ans.PbI_4 does not exist because Pb – I bond initially formed during the reaction does not release enough energy to unpair $6s^2$ electrons and excite one of them to higher orbital to have four unpaired electrons around lead atom.

9.Why is carbon different from other member of the group?

Ans. Carbon differs from rest of the members of its group due to its smaller size, higher electro negativity, higher ionization enthalpy and unavailability of d-orbital's.

10.Why does the covalence of carbon not expand beyond four?

Ans. In carbon, only s and p orbital's are available for bonding and therefore it can accommodate only four pairs of electrons around it. This limit the maximum covalence to four whereas other members can expand their covalence due to the presence of d-orbital's.

11.Why does carbon show different allotropic forms?

Ans. Due to property of catenation and pπ - pπ bond formation Carbon is able to show different allotropic forms.

12.Silicon has no allotropic form analogous to graphite. Why?

Ans. Due to large size. Si has little or no tendency for pπ – pπ bonding. Whereas carbon atom forms easily pπ – pπ bonds due to smaller size in graphite structure. Hence, Si does not exhibit graphite structure.

13.Why does graphite conduct electricity?

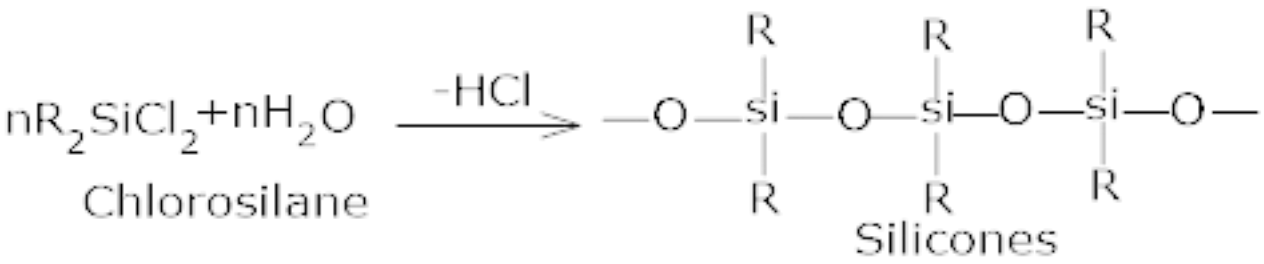
Ans. Graphite forms hexagonal ring and undergoes sp^2 hybridization. The electrons are delocalized over the whole sheet. Electrons are mobile and therefore graphite conducts electricity over the sheet.

14.Graphite is used as lubricant. Give reason.

Ans. Graphite has sp^2 hybridized carbon with a layer structure due to wide separation and weak inter – layer bonds the two adjacent layers can easily slide over each other. This makes graphite act as a lubricant.

15.How are silicones manufactured?

Ans. They are manufactured by hydrolysis of chlorosilanes –



where R is a methyl or phenyl group.

16.Why does CO_2 have a linear shape with no dipole moment

Ans. In CO_2 molecule carbon atom undergoes sp hybridization. Two sp hybridized orbital of carbon atom overlap with two p-orbital's of oxygen atoms to make two sigma bonds while other two electrons of carbon atom are involved in pπ – pπ bonding with oxygen atom. This results in its linear shape [with both c-o bond of equal length (115 pm)] with no dipole moment.

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3 Marks Questions

1.Why carbon does not form ionic compounds?

Ans. The electronic configuration of carbon atom is $1s^2$ $2s^2$ $2px^1$ $2py^1$ and has four valence electrons. In order to form ionic compound, it has to either lose four electrons or gain four electrons. Since very high energy are involved in doing so. Carbon does not form ionic compounds. It completes its octet by sharing of electrons and forms covalent compounds.

2.Why does the heavier elements do not form pπ – pπ multiple bond as carbon do?

Ans. Carbon has the unique ability to form pπ – pπ multiple bond with itself and with other atoms of small size and high electro negativity whereas heavier elements do not from pπ – pπ bonds because their atomic orbital's are too large and diffuse to have effective overlapping.

3.Why is CO considered poisonous ?

Ans. The highly poisonous nature of CO arises because of its ability to form a complex with haemoglobin which is about 300 times more stable than the oxygen – haemoglobin complex. This prevents haemoglobin in the red blood corpuscles from carrying oxygen round the body and ultimately resulting in death.