
	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	Department: SCIENCE 2021 - 22 SUBJECT :CHEMISTRY	Date of submission: 13.02.2022
Worksheet No: 13 WS WITH ANS.	Chapter: THE p BLOCK ELEMENTS	Note: A4 FILE FORMAT
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

PASSAGE BASED QUESTIONS

In p-block elements the last electron enters the outermost p orbital. Carbon, silicon, germanium, tin lead and flerovium are the members of group 14. Carbon is the seventeenth most abundant element by mass in the earth's crust. Silicon is the second (27.7 % by mass) most abundant element on the earth's crust and is present in nature in the form of silica and silicates. Sn occurs mainly as cassiterite, SnO₂ and lead as galena, PbS. Flerovium is synthetically prepared radioactive element.

- Name the metalloid found in group 14.
- C, Si are always tetravalent but Ge, Sn, Pb shows divalency. Why?
- C does not form ionic compounds. Why?
- CCl₄ is an electron precise molecule. Explain
- Pb is unaffected by water. Justify.

MULTIPLE CHOICE QUESTIONS (1M)

- In general, Boron trihalides acts as
 - Strong reducing agents
 - Lewis acids
 - Lewis bases
 - Dehydrating agents
- Which is false about Carbon?
 - It has crystalline as well as amorphous allotropes.
 - It can form pπ-pπ bond with other carbon atoms.
 - It cannot form pπ-pπ bond with atoms like N and O.
 - C₆₀ is also one of the allotropes of Carbon.

3. The exhibition of highest co-ordination number depends on the availability of vacant orbitals in the central atom. Which of the following elements is not likely to act as central atom in MF_6^{3-} ?
- B
 - Al
 - Ga
 - In
4. Catenation, i.e., linking of similar atoms depends on size and electronic configuration of atoms. The tendency of catenation in Group 14 elements follows the order
- $\text{C} > \text{Si} > \text{Ge} > \text{Sn}$
 - $\text{C} \gg \text{Si} > \text{Ge} = \text{Sn}$
 - $\text{Si} > \text{C} > \text{Sn} > \text{Ge}$
 - $\text{Ge} > \text{Sn} > \text{Si} > \text{C}$
5. Ionisation enthalpy ($\Delta_i H_1$ kJ mol^{-1}) for the elements of Group 13 follows the order.
- $\text{B} > \text{Al} > \text{Ga} > \text{In} > \text{Tl}$
 - $\text{B} < \text{Al} < \text{Ga} < \text{In} < \text{Tl}$
 - $\text{B} < \text{Al} > \text{Ga} < \text{In} < \text{Tl}$
 - $\text{B} > \text{Al} < \text{Ga} > \text{In} < \text{Tl}$
6. The hybrid state of C in C_{60} is
- sp^3
 - sp
 - sp^2
 - dsp^2
7. A metal M forms chlorides, MCl_2 and MCl_4 (+2 and +4 oxidation states). Which of the following statements about these chlorides is correct?
- MCl_2 is more volatile than MCl_4 .
 - MCl_2 is more soluble in anhydrous ethanol than MCl_4 .
 - MCl_2 is more ionic than MCl_4 .
 - MCl_2 is more easily hydrolysed than MCl_4 .
8. Which of the following set contains oxide in the sequence basic, amphoteric and acidic respectively?
- SO_2 , P_2O_5 , CO
 - BaO , Al_2O_3 , SiO_2
 - CaO , SiO_2 , Al_2O_3
 - Al_2O_3 , CO_2 , CO
9. Assertion: Most of the compounds of p-block elements are covalent.
Reason: p-block elements, in general, have high electron affinities.
- Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.
 - Both Assertion and Reason are true and Reason is not the correct explanation of the Assertion.
 - Assertion is true but Reason is false.

d. Assertion is false but Reason is true.

10. Assertion: The heavier p-block elements do not form strong π bonds.

Reason: The heavier elements of p-block form $d\pi-d\pi$ bonds.

a. Both Assertion and Reason are true and Reason is the correct explanation of the Assertion.

b. Both Assertion and Reason are true and Reason is not the correct explanation of the Assertion.

c. Assertion is true but Reason is false.

d. Assertion is false but Reason is true.

SHORT ANSWER TYPE (2 M)

11. Define the terms

a. Inert pair effect.

b. Electron deficient compounds

12. Give reason for the following.

a. IE_1 of the main group elements decreases down the group.

b. IE_1 of Ga > Al.

13. Classify the following as neutral, acidic, basic and amphoteric.

Al_2O_3 , CO_2 , SiO_2 , CO

14. Explain the following.

a. Con. HNO_3 can be transported in aluminium containers.

b. A mixture of NaOH and Al is used to open drains.

15. What happens when (write equations)

a. $SiCl_4$ undergoes hydrolysis.

b. Tin is heated with steam.

SHORT ANSWER TYPE (3 M)

16. Account for the following.

a. Pb^{2+} is more stable than Pb^{4+} .

b. Fullerene is the purest form of carbon.

c. Carbon differs from the rest of the group 14 elements.

17. Justify the following statements.

a. Graphite is a non-metal but a good conductor of electricity.

- b. Diamond is covalent but has a very high melting point.
 c. $[\text{AlF}_6]^{3-}$ is known but not $[\text{BF}_6]^{3-}$

18. Give reason

- a. Graphite is used as a lubricant.
 b. Diamond is a good abrasive.
 c. BF_3 acts as a Lewis acid.

LONG ANSWER TYPE (5M)

19. a. Discuss the structure of Buckminster fullerene.
 b. Explain why SiCl_4 is hydrolysed while CCl_4 is not.
 c. Show the amphoteric nature of Al.
 d. If B–Cl bond has a dipole moment, explain why BCl_3 molecule has zero dipole moment.
 e. How can you explain higher stability of BCl_3 as compared to TlCl_3 ?

20. Match the following.

Column I	Column II
i. BF_4^-	p. Oxidation state of central atom is +4
ii. AlCl_3	q. Strong oxidising agent
iii. SnO	r. Lewis acids
iv. PbO_2	t. Can be further oxidised
	u. Tetrahedral shape

HINTS

Passage based questions

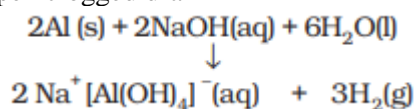
- a. Ge
 b. Inert pair effect prominent down the group.
 c. C- electronic configuration. 4 valence electrons. The nucleus with 6 protons cannot hold 10 electrons. So it cannot form C^{4-} . Carbon cannot lose 4 electrons. Large amount of energy is required to remove 4 electrons. So, it cannot form C^{4+}
 d. In CCl_4 , the number of electrons around C is 8.
 e. protective oxide coating

Multiple Choice questions

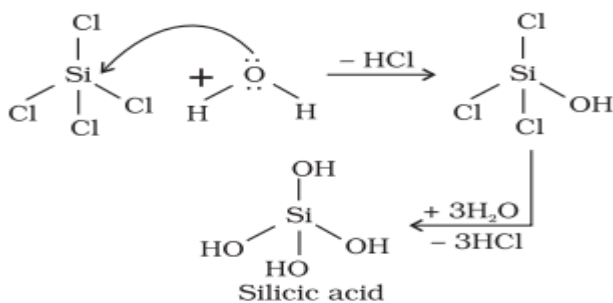
- b
- c
- a
- b
- d
- c
- c
- b
- b
- a

Short Answer Type (2M)

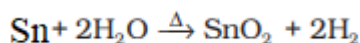
11. a. The inert pair effect is the tendency of the two electrons in the outermost atomic *s*-orbital to remain unshared. Inert pair effect is the increasing stability of oxidation states that are two less than the group valency for the heavier elements of groups 13, 14, 15 and 16. The outermost *s* electrons are more tightly bound to the nucleus in these atoms, and therefore more difficult to ionize or share.
- b. Certain compounds have central atom with lesser number of valence electrons when compared to octet configuration. Hence, they are good electron acceptors. Eg BCl₃
12. a. Z_{eff} decreases, shielding effect increases, Outermost electrons are loosely bonded to the nucleus down the group.
- b. Ga – d orbital -offer poor shielding effect and hence the outermost electron is closely bonded to the nucleus.
13. Al₂O₃ – amphoteric
CO₂ – acidic
SiO₂ – acidic
CO - Neutral
14. a. Conc. HNO₃ can be stored and transported in aluminium containers since it reacts with aluminium to form thick protective oxide layer which makes aluminium passive.
- b. Aluminium pieces dissolve in dilute NaOH to evolve dihydrogen **gas** whose presence can be used to open clogged drain



15. a.



b.



Short Answer Type (3M)

16. a. Inert pair effect
- b. Fullerenes are pure carbons that are in the shape of spherical hollow cage like a soccer ball with 60 carbon atoms. Fullerene is the purest as it has no surface bonds to attract other molecules to react with it.
- c. Anomalous behaviour- explain
17. a. Each carbon atom in hexagonal ring, sp^2 hybridisation and makes three sigma bonds with three neighbouring carbon atoms.
Fourth electron forms a π bond. The electrons are delocalised hence conductor.

- b. In diamond each carbon atom - sp^3 hybridisation and linked to four other C atoms in tetrahedral fashion.
The structure extends in space and produces a rigid three-dimensional network of carbon atoms.
- c. Al has 3d orbitals whereas B does not have.

18. a. Graphite has layered structure. Layers are held by van der Waals forces and distance between two layers is 340 pm. Each layer is composed of planar hexagonal rings of carbon atoms.
Graphite cleaves easily between the layers and, therefore, it is very soft and slippery.

b. In diamond each carbon atom undergoes sp^3 hybridisation and linked to four other carbon atoms by using hybridised orbitals in tetrahedral fashion. The structure extends in space and produces a rigid three-dimensional network of carbon atoms. In this structure, directional covalent bonds are present throughout the lattice.

c. Electron deficient, electron pair acceptor

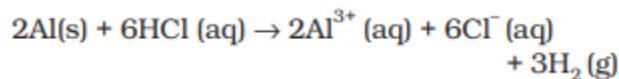
Long answer Type (3M)

19. a. Fullerenes are cage like molecules. C_{60} molecule has a shape like soccer ball and called Buckminsterfullerene

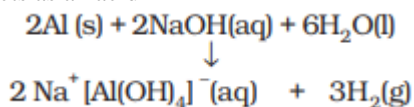
It contains twenty six- membered rings and twelve five-membered rings. All the carbon atoms are equal and they undergo sp^2 hybridisation. Each carbon atom forms three sigma bonds with other three C atoms.

b. Si undergoes hydrolysis by initially accepting lone pair of electrons from water molecule in d orbitals of Si, finally leading to the formation of $Si(OH)_4$.

c. Al acts as a base



Al acts as an acid



d. The resultant of dipoles 1 and 2 will be equal and opposite to the third dipole.

e. TI – Inert pair effect hence +1 is more stable.

20. i – u
ii – r
iii – t
iv - p, q

PREPARED BY:MS. JASMIN JOSEPH

CHECKED BY:HOD - SCIENCE