ARNAV PANT

SS1 - B

GYAN BHARATI SCHOOL
Half Yearly Examination (2016-17)
Class SS1
Subject – Chemistry

Time allowed- Three Hrs *MM- 70*

General Instructions:

- *All the questions are compulsory.*
- *Q. Nos.1-5 are very short questions, carrying one mark each.*
- *Q. Nos. 6-10 are short answer questions, carrying two marks each.*
- *Q.Nos.11-22 are also short answer questions carrying 3 marks each.*
- *Q. No. 23 is value based question, carrying four marks.*
- *Q. No. 24-26 are long answer questions, carrying 5 marks each.*
- *Use log tables, if needed.*

R= 8.314 $JK^{-1}mol^{-1}$, 0.083 bar $dm^3 K^{-1}mol^{-1}$, 0.082 L atm $K^{-1}mol^{-1}$,
h=6.62 X 10^{-34} Kgm^2s^{-1}, Avogadro's No. = 6.023X10^{23} mol^{-1}
Atomic number C = 6, O = 8, Al= 13, Ar=18, Ti =22, Fe = 26, Ga= 31

---

1. Which is filled first- 5p or 4f and Why? (1)

2. Oxygen cannot have d orbitals. Why? (1)

3. Why is the formation of $F^-_{(g)}$ from $F_{(g)}$ is exothermic but $O^{2-}_{(g)}$ from $O_{(g)}$ is endothermic? (1)

4. The tyres of automobiles are inflated to a lesser pressure in summers than in winters. Why? (1)

5. Which out of NH_3 and NF_3 has higher dipole moment? Justify. (1)

6. How do you account for the following?
   a. CO is more dangerous than CO_2. Why
   b. Fishes donot grow both in warm water as well as cold water. (1x2)

7. In the reaction $Fe^{3+} + 2I^- \longrightarrow Fe^{2+} + I_2$
   a. Which substance is oxidized?
   b. Which substance is getting reduced?
   c. What is the oxidizing agent?
   d. Which is the reducing agent? (1/2 x 4)

8. Give reasons for the following:
   a. First ionization energy of Nitrogen higher than that of oxygen.

b. Ga has smaller radius than Al. (1x2)

9. A solution of Ferrous sulphate was to be stirred with copper spatula, but a student by mistake used a nickel spatula to do the same. How would this affect his observations?
The reduction potential are: $E^\circ Fe^{2+}/Fe = -0.44V$, $E^\circ Cu^{2+}/Cu = 0.34V$, $E^\circ Ni_{2+}/Ni = -0.25V$. (2)

OR

9. Can we store ferrous sulphate solution in a nickel vessel? (2)

10. Define lattice enthalpy and explain the factors affecting it. (2)

11. The mass of an electron is 9.1×10^{-31} kg. If its K.E. is 3.0×10^{-25} J, calculate its wavelength. (3)

12. Give reasons for the following:
a. LiF is insoluble in water.
b. The solubilities of hydroxides increase down the group among the group II hydroxides.
c. MgO has higher melting point than Na_2O. (1x3)

13. Given below are the ionization potentials of three elements X, Y and Z

	X	Y	Z
IE1	403	549	1142
IE2	2640	1060	2080

Identify the element which is likely to be:
a. Smallest in size.
b. Tendency to form dipositive ion.
c. Most reactive metal? Justify your answers. (1x3)

14. a. What is oxidation number of B in $Na_2B_4O_7$?
b. Using quantum mechanical approach explain why does He_2 not exist? (1+2)

15. Explain hybridization and shape of C_2H_2. Draw the orbital diagram also. (3)

16. One liter of semi molar HCl was heated. The volume was reduced to 750 ml and 2.875 g of HCl was lost. Find the molarity of this solution and millimoles of HCl in 400 ml of it. (3)

17. a. Give reasons for the following:
(i) Water is a liquid, but Hydrogen sulphide is a gas at room temperature.
(ii) Boiling point of a substance increases on adding Sodium chloride to it. (1x2)
b. A room with volume V, contains n moles of a gas at temperature T and pressure P. An equal volume of the gas is added to the room at same temperature. What is the new pressure and new temperature? (1)

18. a. Calculate the volume of SO_2 that is produced at STP by burning 500 g of a sample of Sulphur that contains 5% sand as impurity. (2)

b. Define equivalent weight of an acid. (1)

OR

18. A piece of Al weighing 5.1 g was heated with 300 mL of H_2SO_4 (25% by mass, density=1.18 g/mL). After completion of reaction the solution is diluted to 800 mL by adding water. What is the molarity of free H_2SO_4 in resulting solution? (3)

19. a. How is a hybrid orbital different from atomic orbital?
b. Explain the hybridization and the shape of SF_4. (1+2)

20. a. A human adult breathes in approximately 0.050 L of air with each breath. If an air tank holds 8L of air at 220 atm, how many breaths the tank supply?
b. At high altitudes people suffer with headache / nausea. Why? (2+1)

21. Balance the following reactions by any method:

a. $As_2S_3 + NO_3^- \rightarrow AsO_4^- + S + NO$ Acidic medium
b. $Br_2 + H_2O_2 \rightarrow BrO_3^- + H_2O$ acidic medium
c. $Al + NO_3^- \rightarrow Al(OH)_4^- + NH_4^+$ Basic medium (1x3)

22. X gm of oxalic acid $(COOH)_2.2H_2O$ is dissolved in 250 ml of solution. On titrating 10 ml of this solution required 17 ml of 0.15 N NaOH. Calculate X. (molecular mass oxalic acid = 126 g/mol) (3)

23. Mintu's grandmother asked him to take the old and damaged idols and immerse them the nearby river. Mintu noticed that river water was covered with algae and was stinking badly. He immediately decided to write to the municipal commissioner to make necessary arrangements to clean the river.
a. What are the values shown by Mintu?
b. What is the effect of excess lead ions in water due to paint on the idols?
c. Why is the river water covered by algae stinking?
d. What harmful effect is caused by Ba^{2+} ions in drinking water? (1x4)

24. a. How many electrons in Argon can have anticlockwise spin?
b. What is the difference between the notations l and L?
c. write the quantum numbers of the 26^{th} electron in Fe.
d. An element with mass number 81 contains 31.7% more neutrons as compared to protons. Assign the atomic symbol. (1+1+1+2)

OR

24. a. Using uncertainty principle, prove that an electron cannot exist in the nucleus. Assume radius of the nucleus = 10^{-15} m.
b. Show that Heisenberg uncertainty principle is of negligible significance for an object of mass one mg.
c. How many unpaired electron are there in Ti^{2+} ion? (atomic no. Ti = 22) (2+2+1)

25. a. Give reasons for the following:
   i. The electron gain enthalpies of inert gases are positive.
   ii. Mg^{2+} ion is smaller than O^{2-} though both are isoelectronic.
   iii. IE_1 of Be is less than that of B.
   b. Write the electronic configuration of element that belongs to group 14 and third period.
   c. Al^{3+} ion is bigger / smaller than Na^+ ion. Justify your answer. Why? (3+1+1)

OR

25. a. Arrange the following as indicated:
   i. B, Mg, Al, K ---- increasing metallic character.
   ii. Cu^+, Cu^{2+}, Cu ---- increasing size. Give reasons for your answer. (1x2)
   b. Consider the configuration of four elements A, B, C and D and answer the questions given below: A : $1s^2\ 2s^2\ 2p^5$ B: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$
   C: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$ D: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$
   i. Which elements belong to same group?
   ii. Which belong to same period?
   iii. Which is smallest in size?
   iv. Which has highest IE_1?
   v. Which has highest IE_2?
   vi. What is the group number of element D? (1/2 x 6)

26. a. Which has a higher bond angle H_2O, or NH_3 ? Justify your answer
   b. Calculate number of sigma and pi bonds in $CH_3CH_2CH_2CH{=}CHC{\equiv}CH$.
   c. Why is $CaSO_4$ more soluble in water than $BaSO_4$?
   d. All the bonds in PCl_5 are not equal. Explain.
   e. Write two differences between σ and π bond. (2+1+1+1)

OR

26. a. The dipole moment of BF_3 is equal to zero although it has polar bonds?.
   b. How will the hybridization and the shape change for the following reaction: $AlCl_3 + Cl^- \rightarrow AlCl_4^-$?
   c. Arrange the following in order of
   (i) increasing basic character : NaOH, KOH, LiOH, CsOH.
   (ii) increasng thermal stability : $BeCO_3$, $BaCO_3$, $CaCO_3$. (1+2+2)
