

BVN

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FIRST TERMINAL EXAMINATION-2014-2015

Class-XI

Subject-Chemistry

Time Allowed : 3 Hrs.

M.M. : 70

Please Check the Total Marks

Do not write any answers on the questions paper. Check the total marks.

Instructions :

- (1) All Questions are compulsory.
- (2) Question Nos. 1-5 are very short answer questions and carry 1 mark each.
- (3) Question nos. 6-10 are short answer questions and carry 2 marks each.
- (4) Question nos. 11-22 are short answer questions and carry 3 marks each.
- (5) Question No. 23 carries 4 marks
- (6) Questions nos. 24-26 are long answer questions and carry 5 marks each.
- (7) Use of calculators not allowed.

1. ✓ State the law of definite proportions. (1)

2. ✓ What would be the IUPAC name and symbol for the element with atomic number 117 ? (1)

3. ✓ Give an example of odd electron species and draw its lewis structure. (1)

4. ✓ Why are falling liquid drops spherical ? (1)

5. ✓ What is an isothermal process ? (1)

6. ✓ Which of the two :-NH₃ Or NF₃ has a higher dipole moment ? Explain (2)

7. ✓ (i) Be F₂ and H₂O are both triatomic molecules but have different shapes. Discuss. (2)

(ii) Arrange CH₄, BCl₃, SF₆ in decreasing order of bond angle

8. ✓ (i) Out of CO₂ and N₂, which will deviate more from ideal gas behaviour at a given temperature and why ?

(ii) Why are vegetables cooked with difficulty at a hill station ? (2)

9. Arrange the following in the increasing order of property mentioned :

- (i) Si, Mg, Na, P (metallic character)
(ii) S, O, Cl, N (negative electron gain enthalpy) (2)

OR

(i) Why is the first ionization enthalpy of P (at no.15) higher than that of S (at no. 16)

(ii) Name the two series of inner transition elements.

10. The first ($\Delta_i H_1$) and the second ($\Delta_i H_2$) ionization enthalpies (in KJ mol^{-1}) and the ($\Delta_{eg} H$) electron gain enthalpy (in KJmol^{-1}) of a few elements are : (2)

Element	$\Delta_i H_1$	$\Delta_i H_2$	$\Delta_{eg} H$
I.	419	3051	-48
II	1681	3374	-328
III	2371	5251	+48
IV	738	1451	-40

Which of the above elements is likely to be :

- (i) The least reactive element
(ii) The most reactive metal
(iii) The most reactive non-metal
(iv) The metal which can form a stable binary halide of the formula MX_2 (X = halogen)

11. (i) Arrange the following orbitals in the increasing order of energy : 3d, 4s, 4d, 4p (3)

(ii) The unpaired electrons in Al and Si are present in 3p orbital. The electron in which of these two elements will experience more effective charge from the nucleus ? Why ?

(iii) Which orbit of hydrogen has radius 13.225 A ? Calculate


12. A chemical compound is found to have the following composition : C=19.44%, Fe=15.12%, N=22.68%, K=42.76% Calculate the empirical formula of the compound. (at. mass of C=12, Fe=56, N=14, K=39) (3)

13. (i) State Avogadro's Law

(ii) The density of 3 molal solution of NaOH is 1.12g.mL^{-1} . Calculate the molarity of the solution . (at. mass Na=23, O=16, H=1) (1+2)

OR

Commercially available concentrated hydrochloric acid contains 38% HCl by mass. Its density is 1.1 g cm^{-3} . (at. mass of H=1, Cl=35.5)

- (i) What is the molarity of the solution ?
- (ii) How much volume of this acid is required to make 1L of 0.1 M HCl ?
14. (i) What is a limiting reactant ?
- (ii) 16.2mg. sample of an element 'X' contains 1.8×10^{20} atoms. Calculate the atomic mass of 'X'. (1+2)
15. (i) Write two important reasons for the anomalous behaviour of second period elements.
- (ii) Why are there fourteen elements in the lanthanoid series ?
- (iii) The first electron gain enthalpy value of O is negative whereas the second is positive. Give reason. (3)
16. (i) Represent intermolecular hydrogen bonding with an example.
- (ii) What is the change in hybridisation of Al atom in the following reaction :
 $\text{AlCl}_3 + \text{Cl}^- \rightarrow \text{AlCl}_4^-$? (3)
- (iii) Write two differences between a sigma bond and a pi bond
17. (i) Find the total number of sigma and pi bonds in the molecule -COOH
- (ii) Draw a properly labelled orbital overlap diagram of propene. (3)
18. (i) Under what conditions do gases show maximum deviation from ideal behaviour ?
- (ii) If volume, mass and temperature of two gases H_2 and O_2 kept in separate vessels are the same, in which vessel will the pressure be greater and by how many times ? (1+2)
19. (i) Name the intermolecular forces of attraction between I_2 and HBr.
- (ii) Graphically represent the variation of Pressure (bar) of an ideal gas with $\frac{1}{V}$ at constant pressure. temp. (3)
- (iii) State Charle's Law. (3)
20. 0.07 dm^3 of a sample of nitrogen is collected over water at 27°C and 0.92 bar of Hg. What is the volume of dry nitrogen at S.T.P. ? (3)
- (aqueous tension of water at 27°C = 0.02 bar)

21. The enthalpy of formation of methane(g) from C(s) at constant pressure and 300K is $-78.84 \text{ kJ mol}^{-1}$.

What will be the enthalpy of formation at constant volume ? $R=8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ (3)

22. Calculate the bond enthalpy of H-Cl given that the bond enthalpies of H_2 and Cl_2 are 435.4 and 242.8 KJ mol^{-1} respectively and enthalpy of formation of HCl (g) is $-92.2 \text{ KJ mol}^{-1}$. (3)

23. Different types of electromagnetic waves play very important role in our day to day life. Microwaves heat up our food. Cellphone works by emitting and catching radiations. Though helpful, there are strong views that these radiations are harmful, if we are exposed to them for a long time.

(i) What values are expressed in the above paragraph. ?

(ii) Should microwave oven be used for heating or cooking food at home ? Comment with points in favour and against.

(iii) Arrange X-rays, ultraviolet rays and radiowaves in order of frequency.

(iv) How are frequency and wave number related to each other ? (4)

24. (i) State Heisenberg's uncertainty principle.

(ii) Write the electronic configuration of Fe^{3+} ($z=26$)

(iii) A moving electron has 4.55×10^{-25} joules of kinetic energy Calculate its wavelength ($m_e = 9.1 \times 10^{-31} \text{ kg}$, $h = 6.6 \times 10^{-34} \text{ kgm}^2 \text{ s}^{-1}$) (1+1+3)

OR

(i) How many unpaired electrons are present in Ni^{2+} ($z=28$)

(ii) Why does the ball, hit with a hockey stick by a player, not show wave character?

(iii) What is the wavelength of radiation emitted during a transition from $n=5$ to $n=2$ in hydrogen atom ? ($R=109677 \text{ cm}^{-1}$)

25. (i) With box diagram, represent the hybridisation of P in PCl_5 .

(ii) Why is LiCl more covalent than NaCl ?

(iii) Draw the molecular orbital diagram of N_2 . Write its configuration. Calculate its bond order. Write its magnetic character. (1+1+3)

OR

(i) Why are the axial bonds in PCl_5 longer than the equatorial bonds ?

(ii) Write two conditions which favour the formation of ionic bonds.

(iii) Draw the molecular orbital diagram of O_2 . Write its configuration. Calculate its bond order. Write its magnetic character.

26. (i) What is the sign of entropy change for the following process : (C graphite) \rightarrow C diamond)

(ii) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ $\Delta_r H^\circ = -92.4 \text{ KJ}$

What is the standard enthalpy of formation of NH_3 ?

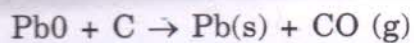
(iii) The standard enthalpy of combustion at 25°C of H_2 , C_6H_{10} and C_6H_{12} are -241 , -3800 and -3920 KJ/mol respectively calculate the enthalpy of hydrogenation of C_6H_{10} . (1+1+3)

OR

(i) State Hess's law.

(ii) In cold climate, freezing of water is spontaneous, even though it involves decrease in entropy of the system. Give reason

(iii) At what temperature does the reduction of lead oxide to lead by carbon become spontaneous ?



For the reaction, ΔH and ΔS at 25°C are $108.4 \text{ KJ mol}^{-1}$ and $190 \text{ JK}^{-1} \text{ mol}^{-1}$ respectively.