

ID 300

SECOND TERMINAL EXAMINATIONS DECEMBER - 2014**Class - XI****Subject - Chemistry**

Time - 3 hrs.

M.M. 70

General Instructions :- Attempt all questions

- 1. Question Nos. 1 to 5 are very short answer questions of one mark each.**
- 2. Question Nos. 6 to 10 carry 2 marks each.**
- 3. Question Nos. 11 to 22 carry 3 marks each.**
- 4. Question No. 23 carries 4 marks.**
- 5. Question Nos. 24 to 26 carry 5 marks.**
- 6. Calculators are not allowed.**
- 7. Use log tables if required.**

Q. 1. State first law of thermodynamics.

Q. 2. Write electronic configuration of Chromium. (z=24)

Q. 3. Why noble gases have zero electron affinities? *+ive electron gain enthalpy*

Q. 4. The number of electrons, protons and neutrons in a species are equal to 10, 8 and 8. Assign proper symbol.

Q. 5. The molecule of SO_2 has a dipole moment. Is it linear or bent?

Q. 6. Calculate the number of molecules in a drop of water weighing 0.05 g [H=1, O=16]

Q. 7. The size of cation is always smaller than parent atom. Explain.

Q. 8. BF_3 does not have proton but still acts as acid and reacts with NH_3 . Why is it so? What type of bond is formed between the two?

Q. 9. An electron has a speed of 40 m/s accurate upto 99.99%. What is uncertainty in locating its position ?
[Given $m_e = 9.11 \times 10^{-31}$ kg]

OR

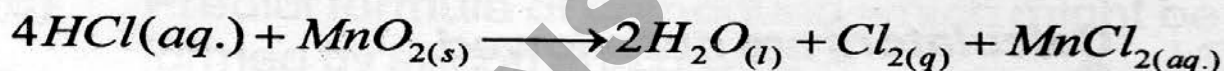
(a) State Pauli's exclusion principle.

(b) Why Bohr's orbits are called stationary orbits.

Q. 10. Indicate the σ and π bonds in following compounds:-

(a) C_6H_6 (b) C_6H_{12}

Q. 11. Chlorine is prepared in laboratory by treating manganese dioxide (MnO_2) with aq. HCl according to ∂x^n



How many grams of HCl react with 5.00 g of MnO_2 ?

[Mn = 55, H = 1, Cl = 35.5, O = 16]

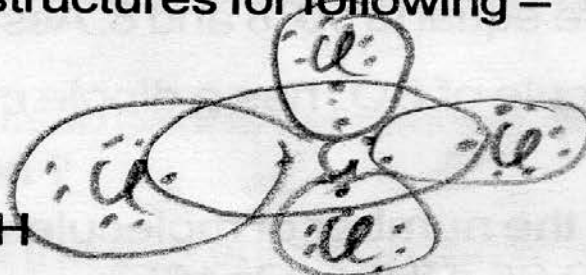
Q. 12. What is maximum number of emission lines when the excited electron of an H-atom in $n=6$ drops to ground state ?

Q. 13. Draw Lewis structures for following -

(a) $SiCl_4$

(b) BeF_2

(c) $HCOOH$



Q. 14. Define electronegativity. How does it differ from electron gain enthalpy ?

Q. 15. (a) For ∂x^n $2Cl_{(g)} \longrightarrow Cl_{2(g)}$ What are signs of ΔH and ΔS ? Explain.

$-ve$ $-ve$

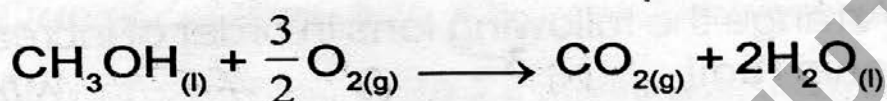
(b) For ΔG° at 298°K $2A + B \longrightarrow C$

$$\Delta H = 400 \text{ kJ/mol}, \Delta S = 0.2 \text{ kJ/mol/K}$$

At what temp. will ΔG° become spontaneous ?

OR

Calculate the standard enthalpy of formation of $\text{CH}_3\text{OH}_{(l)}$ from following data :-



$$\Delta H = -726 \text{ kJ/mol}$$



Q. 16. (a) Write Vander walls eqⁿ for 'n' moles of a real gas.

(b) An open beaker at 27°C is heated to 477°C. What fraction of air would have been expelled out?

$$\frac{477}{273} = \frac{2+3}{2}$$

Q. 17. Compare relative stability of N_2 , N_2^+ , N_2^- and N_2^{2-} by calculating bond order.

Q. 18. Describe hybridisation scheme in PCl_5 . Why are axial bonds longer as compared to equatorial bonds ?

Q. 19. Calculate number of moles of Hydrogen gas present in 500 cm³ of gas taken at 300 K and 760 mm pressure. If this sample of hydrogen is found to have mass equal to 4.9×10^{-2} g calculate molar mass of Hydrogen (R =

$$f = \frac{p \cdot \frac{m}{V}}{1.5^2 \cdot 2.5^2 \cdot 3 \cdot 5} \quad 2, 8, 1$$

0.0821 L atm^kmol⁻¹)

Q. 20. Predict if the solutions of following salts are neutral, acidic or basic :

NaCl, KBr, NaCN, NH₄NO₃, NaNO₂ and KF

Q. 21. Derive a relation between heat of ∂x^n at constant pressure and at constant volume

$$\Delta H = \Delta U + \Delta ngRT$$

Q. 22. (a) Arrange the following ions in order of increasing ionic radii. N^{3-} O^{2-} F^- Na^+ Mg^{2+}

(b) Explain why Be has higher Ionization enthalpy than B.

(c) Predict formula of compound which might be formed by silicon and bromine.

Q. 23. Esha and Jyoti were preparing for class test. Esha asked Jyoti, "We have general gas eqⁿ PV = RT but on substituting the value we find that PV is almost never equal to RT, it is either less than or more than RT. What is the reason?" Jyoti said, "I tell you. The PV = RT equation is based on certain assumptions which are not always met. That is why PV is not equal to RT always".

(a) What assumptions we make in derivation of gas equation?

(b) What is the gas equation for 'n' moles of a real gas?

Q. 24. (a) Write conjugate acids of CH₃COO⁻

(b) Calculate pH of 1.0 x 10⁻⁸ M solution of HCl

(c) Calculate solubility of A₂X₃ in pure water,

Na⁺, Mg²⁺

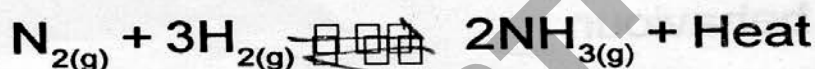
assuming that neither kind of ion reacts with water. The solubility product of

$$A_2X_3 K_{sp} = 1.1 \times 10^{-23}$$

$K_{sp} =$

OR

- (a) Write conjugate acid of NH_3 .
- (b) Give reason :-
- (i) A solution of NH_4Cl in water shows pH less than 7.
- (c) In qualitative analysis NH_4Cl is added before adding NH_4OH for testing Fe^{+3} or Al^{+3} ions.
- (c) Consider the ∂x^n



Indicate the direction in which the equilibrium will shift when :

- (i) Temperature is increased
- (ii) Pressure is increased

Q. 25. (a) Define and explain

- (i) Adiabatic process
- (ii) heat of formation

(b) Write resonating structures of NO_3^- and CO_3^{2-}

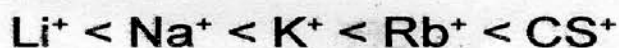
OR

- (a) Explain free energy.
- (b) Give relationship between q_p and q_v
- (c) Which out of NH_3 and NF_3 has higher dipole moment and why ?

Pauli's exclusion rule⁵ state that the set of quantum no. possessed by any an electron is expelled out for other electron.

Q. 26. (i) Comment on following :-

(a) The mobilities of alkali metal ions in aq. Solution are



(b) Lithium is only alkali metal which forms nitride directly

(c) A solution of Na_2CO_3 is alkaline

(ii) Explain (a) Common ion effect

(b) Buffer solutions

OR

(a) Draw M.O. dig. of N_2^+ predict its magnetic behaviour.

(b) A swimmer coming out from a pool is covered with a film of water weighing about 18 g. How much heat must be supplied to evaporate this water at 298°K ? Calculate internal energy of vaporisation at 100°C ?

$$\Delta H_{\text{vap}}^0 \text{ for water at } 373^\circ\text{K} = 40.66 \text{ kJ/mol}$$

10/11
 18
 Any us 13as

$\Delta U = \Delta H - P\Delta V$
 $\Delta U = \Delta H - \Delta n_g RT$