INDIAN SCHOOL SOHAR
PRE FINAL EXAM
CHEMISTRY

STD: XI | MARKS: 70
Date:28-01-2018 | TIME: 3Hrs

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 is short answer question and carry 4marks.*
6. *Question nos. 24-26 are long answer questions and carry 5 marks each.*
7. *Write serial no. of the question before attempting it.*
8. *Use log tables for calculations.*

---

1. Which type of intermolecular forces exists between NO_3^- and I_2?

2. What is the change in internal energy of a process if during the process, 700J of heat is absorbed by a system and 395J of work is done by the system?

3. Arrange the 3 isomers of C_5H_{12} in the increasing order of their boiling point.

4. Is it possible to store $CuSO_4$ solution in nickel vessel? Justify given $E^o_{Cu2+/Cu} = +0.34V$; $E^o_{Ni2+/Ni} = -0.25V$

5. Write the formula for the conjugate acid and conjugate base of bicarbonate ion.

6. a) Write the structure of 5-(2-ethylbutyl)-3,3-dimethyldecane.
   b) Write the IUPAC name of the given compound: $CH_3\text{-}CH_2\text{-}CH(Br)\text{-}COOC_2H_5$

7. How is the presence of nitrogen detected in organic compounds? Explain giving reactions.

8. A chemical reaction is carried out by starting with one mole each of H_2 and I_2 in a closed vessel at 700 K. No more change in concentration was observed after 1.6 mole of HI is formed Calculate the value of equilibrium constant K_c.

9. 500cc of 0.25M Na_2SO_4 solution added to an aqueous solution of 26 g of $BaCl_2$ resulted in the formation of a white precipitate of $BaSO_4$. How many moles and grams of $BaSO_4$ is formed? (molar mass of Na_2SO_4=142 g/mol, $BaCl_2$ = 208 g/mol, $BaSO_4$=233 g/mol)

10. Explain the bonding in ethylene using hybridization.

    OR

    Sketch the shapes of molecular orbitals formed by the overlap of the following orbitals:
    a) End on overlap of 2p orbitals b) side on overlap of 2p orbitals.

11. a) Account for the following:
    i) NH_3 is a base although it does not have OH^- ions in it.
    ii) Aqueous solution of Na_2CO_3 is basic.
    b) What is meant by buffer solution?

12. Explain the following with an example:
    a) Electromeric effect b) Hyperconjugation c) Resonance effect

13. How will you bring about the following conversions?
    a) methane to ethane b) Ethyne to nitrobenzene c) Acetylene to ethanal.

14. a) State Dalton's law of partial pressure.
    b) What will be the pressure of a gaseous mixture when 500 mL of H_2 at 0.8 bar and 2.0 L of O_2 at 0.7 bar are introduced into a 1 L empty vessel at 27^oc?

15.a) Calculate the energy associated with 1^{st} orbit of He^+. What is the radius of this orbit in nm?
    b) What is the atomic number of the element if the values of four quantum numbers for the last electron is 3, 2, -1, -1/2 ?

16. Consider the series : Al^{3+}, Mg^{2+}, Na^+, Ne, F^-, O^{2-}, N^{3-} .
    a) Arrange the above species in the increasing order of their ionic size and ionization enthalpy.
    b) What is the above series called and why?

17. a) What is meant by lattice enthalpy? How does it affect the stability of ionic compounds?
    b) Explain why bonding molecular orbitals are more stable than antibonding molecular orbital.

18.a) Balance the following reaction by ion electron method in acidic medium:

$$S_2O_3^{2-} + Br_2 \longrightarrow SO_4^{2-} + Br^-$$

    b) Which is stronger reducing agent Mg or Fe and why?
    given $E^o_{Mg2+/Mg} = -2.37V$, $E^o_{Fe2+/Fe} = -0.44V$.

19. a) State Hess law of constant heat summation.
    b) Calculate the enthalpy of formation of sucrose($C_{12}H_{22}O_{11}$) if enthalpy of combustion of sucrose, carbon and hydrogen are -5200.7, -394.5 and -285.8 $KJmol^{-1}$ respectively.

20. Illustrate the following with an example:
    a) Wurtz reaction b) ozonolysis c) Friedel crafts alkylation

21. State law of mass action. Derive the expression for the equilibrium constant K_c for the reaction $aA + bB \rightleftharpoons cC + dD$

OR

    a) Comment on the statement "chemical equilibrium is dynamic in nature".
    b) Write any two characterictics of equilibrium.

22. What is a salt bridge? What are its functions?

23. Mr. Arun is habitual of smoking. Polynuclear hydrocarbons are formed on incomplete combustion of organic materials like tobacco. They enter the human body and undergo various biochemical reactions and finally damage DNA and cause cancer. Mr. Vinay does not smoke and even does not sit with people habitual of smoking.
    Based on the above passage, answer the following questions:
    a) Do you favor the ban on tobacco products? Give reason.
    b) How will you make people aware of harmful effects of smoking? (Any two)
    c) What are the values possessed by Mr. Vinay?

24.a) Explain the resonance structure of benzene. Give two evidences which support resonance structure of benzene.

b) Draw the Sawhorse and Newman projection of butane using C-2 to C-3 bonds as references for staggered and eclipsed conformers..

OR

a) Explain giving reactions what happens when:

i) Aqueous solution of sodium acetate is electrolyzed.

ii) Sodium ethanoate is heated with soda lime.

iii) Ethene is treated with cold, dilute, aqueous solution of alkaline $KMnO_4$ solution.

b) What is the product obtained when propene is treated with HBr? State the rule applied.

25. a) State Le-Chatelier's principle.

b) Based on the above principle, explain the effect of the following on the state of equilibrium for the reaction $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$ + heat

i) increase in pressure ii) decrease in temperature.

c) 50.0 g of $CaCO_3$ is heated to 1073 K in a 5 L vessel. What percent of $CaCO_3$ would decompose at equilibrium? Kp for the reaction $CaCO_3$ (s) $\rightleftharpoons$ $CaO(s) + CO_2(g)$ is 1.15 atm at 1073 K. (Atomic mass of Ca=40, O=16, C=12, R=0.0821 $LatmK^{-1}mol^{-1}$)

OR

a) Explain what happens to the solubility of AgCl in water when a small amount of NaCl is added to the solution ? What is this effect called?

b) How many grams of NaOH must be dissolved in 1L of the solution to give it a pH of 12? (atomic mass of Na=23, 0=16, H=1)

c) If the equilibrium constant for the reaction $2SO_2 + O_2 \rightleftharpoons 2SO_3$ is K_c, what is it for the reaction $SO_2 + ½\ O_2 \rightleftharpoons SO_3$?

26. a) For the reaction $C_3H_8 + 5O_2 \longrightarrow 3CO_2 + 4H_2O$, if bond enthalpies of C-C, C-H, C=O, O=O and O-H are 347, 414, 741, 498 and 464 $KJmol^{-1}$respectively, calculate the standard enthalpy change of the reaction.

b) Explain the effect of increased temperature on the entropy of a substance.

c) Predict whether entropy will increase or decrease in the following cases. Justify.

i) HCl is added to $AgNO_3$ solution and precipitate of AgCl is obtained.

ii) $2NaHCO_3(s) \longrightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$

OR

a) For the reaction, $N_2\ (g) + 3H_2\ (g) \longrightarrow 2NH_3(g)$, if the enthalpy change and entropy change are -95.4 KJ and -198.3 JK^{-1} respectively, calculate the temperature at which Gibb's free energy is equal to zero. Predict the nature of the reaction at this temperature and above it.

b) How does Gibb's-Helmholtz equation help in developing the conditions under which ΔG is negative?

c) What do you mean by state function?