INDIAN SCHOOL SOHAR
SECOND TERM EXAM
CHEMISTRY

STD: XI MARKS: 70
Date:20-11-2016 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 nos11-22 are short answer questions and carry 3 marks each.*
5. *Question no. 23 is short answer questions 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.*

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1. What is meant by auto protolysis of water?

2. Which is more acidic : ethene or ethyne ? why?

3. Which is more stable ? $CH_3CH_2CH_2$ or $NO_2CH_2CH_2$. Justify.

4. Why does NH_4Cl dissolve in water spontaneously even when this process is endothermic?

5. Calculate the total number of electrons present in 1.4 g of nitrogen gas. (Z=7, At.mass=14)

6. What is meant by ozonolysis? Write the reaction when 2-methylpropene undergoes ozonolysis

7. A mixture of oxygen and hydrogen at one bar pressure contains 20% by weight of hydrogen. Calculate the partial pressure of hydrogen.

8. For the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$, the partial pressures of N_2 and H_2 are 0.80 and 0.40 atmospheres respectively at equilibrium. The total pressure of the system is 2.8 atm. What is K_p for the above reaction?

9. Define the terms : a) Buffer solution b) Common ion effect.

OR

Derive the Henderson-Hasalbalch expression for the pH of acidic buffer.

10. State Pauli Exclusion Principle. How does it put a limit on the accommodation of electrons in an orbital? Explain.

11.a) State Henry's law. Explain why the gas fizzes out when a soda water bottle is opened?
b) What do you understand by dynamic nature of chemical equilibrium?

12. In a reaction between $CaCO_3$ and HCl, 5 g of $CaCO_3$ was added to 7.5 g dilute hydrochloric acid. After the reaction was completed, it was found that 0.5 g of $CaCO_3$ was left unused. Calculate the percentage strength of hydrochloric acid. What volume of CO_2 measured at STP will be evolved in the above reaction?
(Atomic mass of H = 1, C = 12, O = 16, Cl = 35.5, Ca = 40 $gmol^{-1}$)

13. Why hard water does not give lather with soap. Explain any two methods of removing hardness of water with reactions.

14.a) What is photoelectric effect?

b) Calculate the frequency and wavenumber of a radiation having wavelength 500nm. (Velocity of light c = 3 x $10^8 ms^{-1}$)

15.a) Why do noble gases have the largest atomic size in their respective periods?

b) Which element is more metallic- Mg or Al ? Justify.

c) Predict the position of the element in the Periodic table satisfying the electronic configuration $(n-2)f^7(n-1)d^1ns^2$ for n=6

16. Write the structures of A, B and C in the following reactions:

i) $C_6H_5COOH \xrightarrow{NaOH} A \xrightarrow[\Delta]{NaOH, CaO} B \xrightarrow[AlCl_3]{Cl_2} C$

ii) $CH_3COONa \xrightarrow{Electrolysis} A \xrightarrow{Cl_2, h\nu} B \xrightarrow{Na, \text{ dry ether}} C$

17.a) Write the IUPAC name of the following compounds:

i) $Br\text{-}CH_2\text{-}\underset{\displaystyle CONH_2}{\underset{|}{CH}}\text{-}\overset{\displaystyle O}{\overset{\|}{C}}\text{-}CH_2\text{-}CH_3$

ii) $CH_3-\underset{\displaystyle C_2H_5}{\underset{|}{\overset{\displaystyle NO_2}{\overset{|}{C}}}}-CH_2-\underset{\displaystyle C_2H_5}{\underset{|}{\overset{\displaystyle Br}{\overset{|}{C}}}}-CH_3$

b) Write the structure of 2,6-dimethylhepta-2,5-dienoic acid.

18.a) How is the presence of nitrogen detected in organic compounds? Explain and give all reactions involved.

b) What are electrophiles? Give an example.

19.a) What is water gas shift reaction?

b) What is meant by 10 volume H_2O_2?

c) How is H_2O_2 stored?

OR

a) Explain the electrolytic method for the preparation of H_2O_2 giving equations.

b) Write one reaction each where H_2O_2 acts as i) oxidizing agent ii) reducing agent in acidic medium.

20.a) State Hess law.

b) Calculate the enthalpy of formation of benzene if enthalpy of combustion of carbon, hydrogen and benzene are -393, -285.8 and -3267 $KJmol^{-1}$.

21. Define entropy. Predict whether entropy will increase or decrease in the following cases:

a) Crystallisation of sugar from its solution.

b) $CaCO_3(s) \longrightarrow CaO(s) + CO_2(g)$ Account for your answer.

22.a) State Avogadro's law.

b) Two flasks 'A' and 'B' have equal volumes. Flask 'A' contains H_2 at 300K and flask 'B' contains equal mass of CH_4 at 600K.

i) Which flask contains more number of molecules and how many times more?

ii) In which flask is pressure more and how many times more?

23. Natural rain water has a pH of 5.7. However, due to presence of pollutants like SO_2 and NO_2 in the air, pH of rain water becomes less the 5.7. The high acidity of rain water has devastating effect on environment.
a) Calculate $[H^+]$ and $[OH^-]$ ion concentration of rain water.
b) How are gases like SO_2 and NO_2 produced ?
c) What measures can you take to reduce air pollutants? (Any two)

24. a) What are conformers? Draw eclipsed and staggered conformations of butane taking C2-C3 as reference axis in Sawhorse projection. Which one is more stable and why?
b) Draw cis and trans isomers of but-2-ene. Which one has more dipole moment and why?

OR

a) Explain the structure of benzene based on orbital overlapping.
b) Write the mechanism involved in the nitration of benzene.
c) Illustrate the following with an example:
i) Friedel-Crafts alkylation ii) Markovnikov's rule

25.a) State Le Chatelier's principle. Explain its application in the manufacture of NH_3 by the reaction: $N_2 + 3H_2 \rightleftharpoons 2NH_3$; $\Delta H < 0$
b) NH_3 can act both as Bronted base and Lewis base. Justify.

OR

a) State law of mass action. Using this law, derive the expression for K_c for the given reaction:
$aA + bB \rightleftharpoons cC + dD$
b) The solubility product of Ag_2CrO_4 at 298K is 4×10^{-12}. Find its solubility at this temperature.

26.a) What is bond order? Explain its significance.
b) Write the electronic configuration of Ne_2 (Z=10) and calculate its bond order. What do you infer ?
c) Is hydrogen bond stronger or weaker than van der waals forces? Justify.

OR

a) Define dipole moment. Write the applications of dipole moment with examples.
b) Explain the shape of PCl_5 based on hybridization. (Z for P = 15)