INDIAN SCHOOL MUSCAT
DEPARTMENT OF CHEMISTRY
CLASS – XI
SAMPLE PAPER 1

TIME:3 Hrs   **MAX MARKS:70**

General Instruction:

(a) All questions are compulsory.

(b) Section A: Q.no.1 to 20 are very short answer questions (objective type) and carry 1 mark each.

(c) Section B: Q.no.21 to 27 are short answer questions and carry 2 marks each.

(d) Section C: Q.no. 28 to 34 are long answer questions and carry 3 marks each.

(e) Section d: Q.no. 35 to 37 are also long answer questions and carry 5 marks each.

(f) There is no overall choice. However, an internal choice has been provided in two questions of two marks, two questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.

(g) Use log tables if necessary, use of calculators is not allowed.

SECTION-A

Read the given passage and answer the questions 1 to 5 that follows:

Aromatic hydrocarbons are highly unsaturated. Aromaticity is ascertained by Huckel's rule. Resonance stabilization in benzene makes it very stable that it doesn't undergo addition reactions. They normally undergo electrophilic substitution reaction in the presence of Lewis acid catalysts. But in the absence of Lewis acid and in presence of light halogens add to benzene ring. The substituents present in benzene ring direct the incoming electrophile either into ortho and para or meta positions.

Q.1   What is Huckel's rule?

Q.2   Is cyclohepta-1,3,5-triene aromatic? Why?

Q.3   Convert benzene to BHC.

Q.4   What is the directing nature of If NH_2- group?

Q.5   Give the reaction for Friedel Craft's alkylation of chlorobenzene

Questions 6 to 10 are one-word answers:

Q.6   Write Rydberg's equation.

Q.7   Write the shape of AB_2E_3 type molecule.

Q.8 Write the state of hybridization of oxygen in H_2O.

Q.9 Write the mathematical statement of first law of thermodynamics.

Q.10 Define disproportionation reaction with example.

Questions 11 to 15 are multiple choice questions:

Q.11 Identify correct statement regarding NH_3 and BF_3.

(a) Both are Lewis acid   (b) Both are iso structural

(c) Both are Lewis base   (d) Have different values of dipole moment

Q.12 Entropy of universe is :

(a) Increasing   (b) Decreasing   (c) Constant   (d) None of these

Q.13 Which one is ionic hydride in nature?

(a) CrH   (b) NH_3 (c) H_2O (d) NaH

Q.14 Amphoteric hydroxides react with both alkalis and acids. Which of the following Group 2 metal hydroxides is soluble in sodium hydroxide?

(a) $Be(OH)_2$ (b) $Mg(OH)_2$ (c) $Ba(OH)_2$ (d) $Ca(OH)_2$

Q.15 Quartz is extensively used as a piezoelectric material, it contains ....

(i) Pb   (ii) Si   (iii) Ti   (iv) Sn

Question16 to 20:

(A) Both assertion and reason are correct statements and reason is the correct explanation of the assertion.

(B) Both assertion and reason are correct statement, but reason is not the correct explanation.

(C) Assertion is correct but reason is wrong statement.

(D) Assertion is wrong but reason is correct statement.

Q.16 Assertion: Ionic radius of Na^+ is smaller than Na.

Reason: Effective nuclear charge of Na^+ is higher than Na.

Q.17 Assertion: Among the two O – H bonds in H_2O molecule, the energy required to break the first O – H bond and the second O – H bond is the same.

Reason: This is because the electronic environment around the oxygen is the same even after breakage of one O – H bond.

Q.18 Assertion: Enthalpy of graphite is lower than that of diamond.

Reason: Entropy of graphite is greater than that of diamond.

Q.19 Assertion: Silicon is water repelling in nature.

Reason: Silicon is organosilicon polymers, which have $(-R_2SiO-)$ as repeating unit.

Q.20 Assertion: In cation exchange process, H^+ exchanges for Ca^{2+}, Mg^{2+}.

Reason: In anion exchange process OH^- exchanges for anionlike Cl^-, HCO_3^-, SO_4^{2-}.

SECTION: B

Q.21 The density (in g mL^{-1}) of a 3.6 M sulphuric acid solution that is 29% H_2SO_4 (Molar mass = 98 g mol^{-1}) by mass will be ....

(OR)

25 ml of 3.0 M HCl are mixed with 75 mL of 4.0 M HCl. The molarity of the finalmixture will be.

Q.22 Which is more polar and why, CO_2 or N_2O?

Q.23 Critical temperatures of NH_3 and SO_2 are 405.0 and 430.3 K respectively:

(i)Which one is easily liquefiable?

(ii) Which has higher value of Vander Waal constant 'a'?

Q.24 Derive the relationship between ΔH and ΔU.

Q.25 How can the productionof dihydrogenobtained from "Coal gasification "beincreased?

(OR)

Give tworeactions to show amphotericnatureof water.

Q.26 Hydrolysis of $SiCl_4$ take place but of CCl_4 does not. Why?

(OR)

Define zeolite. Name the zeolite which converts alcohols directly into gasoline.

Q.27 What doyou understand by +R and –R effect?

(OR)

Definehyperconjugation.

SECTION:C

Q.28 Calculate :

(i) Mass in gram of 5.8 mol N_2O

(ii) Number of moles in 8.0 g of O_2

(iii) Molar mass if 11.2 L at STP weigh 8.5 g

Q.29 In periodic table

(a) Which group has the most negative first electron gain enthalpy?

(b) Which group shows the most metallic behavior?

(c) Which group has highly positive electron gain enthalpy?

(OR)

(a) Why Ca has larger atomic radius than Al?

(b) Why $2s^2$ electron is difficult to remove than 2p electron?

Q.30 A gas at a pressure of 5 atm is heated from 0°C to 546°C and is simultaneously compressedto one third of its original volume. Find thefinal pressure of the gas.

Q.31 Balance the following equation by half equation method in basic medium:

$$MnO_4^- + S_2O_3^{2-} \rightarrow MnO_2 + SO_4^{2-}$$

Q.32 What happens when:

(i) Mg is burnt in air.   (ii) Quick lime is heated with silica.

(iii) Chlorine is heated with slaked lime.

Q.33 (i) Write the structure of 3, 4-Dimethylhept-3-ene.

(ii) Name the compounds obtained by ozonolysis of 3-Methylpent-2-ene.

Q.34 What is photochemical smog and what are its harmful effects?

SECTION:D

Q.35 (a) State Heisenberg's uncertainty principle. Give its mathematical expression. Also give its significance.

(b) Calculate the uncertainty in the position of a dust particle with mass equal to 1 mg if the uncertainty in its velocity is $5.5 \times 10^{-20} ms^{-1}$.

(OR)

(a) Define the following terms:

(i) Threshold frequency   (ii) Work function.

(b) The work function for Cs atom is 1 .9 eV. Find threshold wavelength (λ_0) and threshold frequency (v_0) of this light radiation. If Cs metal is irradiated with a radiation of wavelength 500 nm find kinetic energy and velocity of the emitted electron.

Q.36 (a) A sample of HI is placed in flask at a pressure of 0.2 atm. At equilibrium the partial pressure of HI is 0.04 atm. What is Kp for the given equilibrium?

$$2HI_{(g)} \rightleftharpoons H_{2(g)} + I_{2(g)}$$

(b) The ionization constant of propanoic acid is 1.32×10^{-15}. Calculate the degree of ionization if its solution is 0.05 M. What will be its degree of ionization if the solution is 0.01 M in HCl solution?

(OR)

(a) A buffer solution contains 0.40 mol of ammonium hydroxide and 0.50 mol of ammonium chloride in 1 L of solution. Calculate the pH of the buffer. Dissociation constant of ammonium hydroxide at 25°C is 1.81×10^{-5}.

(b)The equilibrium constant for the reaction $H_2(g) + Br_2(g) \rightleftharpoons 2HBr(g)$ at 1024 K is 1.6×10^5. Find the equilibrium pressure of all gases if 10.0 bar of HBr is introduced into a sealed container at 1024K.

Q.37 (a) Draw the structural formulae of the following compounds:

(i) Ethoxypropane (ii) But-1-en-3-yne (iii) 3,4,4,-Trimethylhex-1-yne

(iv) sec-butyl alcohol (v) But-2-enoic acid

(b)What is chromatography? Name different types of chromatographic processes.

(OR)

(a) Explain with equation the detection of nitrogen in an organic compound.

(b) Suggest a method to separate the constituents from the following mixture:

(i) Mixture of two miscible liquids

(ii) A mixture of plant pigments

(iii) A mixture of solid benzoic acid and sodium chloride

(iv) o-Nitrophenol and p-Nitrophenol present in the mixture.