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Code Number



**INDIAN SCHOOL MUSCAT
FINAL TERM EXAMINATION
CHEMISTRY**

CLASS: XI

Sub. Code: 043

Time Allotted: 3 Hrs

20.02.2018

Max. Marks: 70

General Instructions:

- All questions are compulsory.
- Marks for each question are indicated against it.
- Question numbers 1 to 5 are very short answer questions and carry 1 mark each.
- Question numbers 6 to 10 are short answer questions and carry 2 marks each.
- Question numbers 11 to 22 are also short answer questions and carry 3 marks each.
- Question number 23 is a value based question and carry 4 marks.
- Question numbers 24 to 26 are long answer questions and carry 5 marks each.
- Use log tables if necessary, use of calculators is not allowed.

- 1 Define molality. 1
- 2 State third law of thermodynamics. 1
- 3 The electronic configuration of an element is $[Ar_{18}] 4s^1 3d^{10}$. Predict the period and group it belongs to. 1
- 4 Which type of intermolecular force exist among the following molecules a) H_2O b) He atoms 1
- 5 Write the conjugate base of a) HCO_3^- b) HF 1
- 6 a) Write the IUPAC name of $CH_3COCH_2CH_2COOH$ 2
b) Draw the structure of 4-Methylpent-2-en-1-ol.
- 7 Why does lithium resemble magnesium in its properties? Give any two similarities between Li-Mg. 2
- 8 Predict the shape and bond angle of a) BCl_3 b) SF_6 2
- 9 Commercially available concentrated HCl contains 38% HCl by mass. What is its molarity, if its density is $1.19 g/cm^3$? [H=1, Cl=35.5] 2
- OR**
- 3g of hydrogen reacts with 35.5g of chlorine to form hydrogen chloride. Find the mass of HCl formed? What is the limiting reagent?
- 10 a) What type of isomerism can be shown by compound having molecular formula $C_4H_{10}O$? 3
b) Explain resonance in aniline.

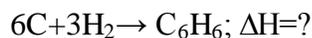
- 11 a) Write the IUPAC name of an element with $Z=114$. 3
 b) Which is smaller and why: Al^{3+} or Al
 c) Why is ionization enthalpy of nitrogen more than oxygen?
- 12 Balance the following equation in basic medium 3
 $MnO_4^- + I^- \rightarrow MnO_2 + I_2$
13. a) Name the orbital having following quantum number: $n=3, l=1$ 3
 b) Which is more stable and why: Mn^{2+} or Mn^{3+} [$Mn=25$]
14. a) What will be the minimum pressure required to compress $500dm^3$ of air at 1bar to $200 dm^3$ at 30^0C ? 3
 b) Calculate the total pressure exerted by a mixture of 2.25 mol of methane and oxygen confined in a vessel of $1dm^3$ at 27^0C . [$R=0.083 \text{ bar } dm^3/K/mol$]
- 15 a) Explain using MOT the bond order and magnetic property of N_2 molecule. 3
 b) Give one difference between bonding molecular orbital and antibonding molecular orbital.
- 16 a) What happens when boric acid is heated? 3
 b) Give reason: CCl_4 cannot be hydrolysed.
 c) Give one use of boron fiber.
17. a) Explain the of addition of HBr to propene using Markovnikov rule. 3
 b) What happens when the major product of the above reaction is treated with sodium in dry ether?
- OR**
- a) Predict the product of ozonolysis of 2-methyl but-2-ene.
 b) Draw the sawhorse projection of the eclipsed conformer of propane.
 c) What happens when phenol is heated with zinc dust?
- 18 Give reason 3
 a) Potassium carbonate cannot be prepared by Solvay's process
 b) Gypsum is added to cement
 c) Lithium carbonate is stored in an atmosphere of CO_2
- 19 a) Explain why $(CH_3)_3C^+$ is more stable than CH_3^+ ?
 b) How is the presence of halogen detected in an organic compound?
 c) What is retention factor [R_f value]?
- 20 a) Differentiate between permanent hardness and temporary hardness. [one point] 3
 b) Describe the permutit process for softening of hard water.
- 21 Calculate the energy and frequency of the radiation emitted when an electron jumps from $n=3$ to $n=2$ 3
 in a hydrogen atom. [$h=6.626 \times 10^{-34}$]

- 22 a) Explain the structure of diborane. 3
b) Complete and balance the equation:
$$\text{Al} + \text{NaOH} + \text{H}_2\text{O} \rightarrow$$

- 23 Taj Mahal, in India, is found to be losing its beauty and shine. It is due to large number of industries and power plants around this area that increase the levels of toxic oxides of Sulphur and nitrogen. 4
These gases are turning the monument discolored and lusterless. Government of India announced an action plan to check the emission of toxic gases that are disfiguring of the Taj.

- a) Name the environmental phenomena affecting the Taj Mahal.
b) Other than affecting monuments, what other harmful effect does this phenomenon has on the environment?
c) What are the values shown by the Government?

- 24 a) State Hess's law of heat summation. 5
b) What will be the sign of ΔH for the reaction: $\text{Ca} \rightarrow \text{Ca}^{2+} + 2e^-$?
c) Calculate the enthalpy change for the formation of benzene. Given enthalpies of combustion of carbon, hydrogen and benzene are -393.5, -285.5 and -3266kJ/mol respectively.



OR

- a) How are intensive properties different from extensive properties?
b) What will be the sign of free energy for a non-spontaneous process?
c) For the reaction, $2\text{NOCl}(\text{g}) \rightleftharpoons 2\text{NO}(\text{g}) + \text{Cl}_2(\text{g})$
Calculate the value of equilibrium constant K_c .
Given $\Delta H = 80 \text{kJ/mol}$, $\Delta S = 120 \text{J/K/mol}$ at 400K. [$R = 8.314 \text{J/K/mol}$].

- 25 a) Explain 5
i) Kolbe's electrolysis of sodium acetate
ii) Friedel crafts acylation of benzene
b) Convert
i) propanol to propene
ii) benzene to nitrobenzene
c) How will you distinguish between propene and propyne.

OR

- a) Explain aromaticity of benzene using Huckel's rule.
- b) Arrange, by giving reason: ethane, ethene and ethyne in the decreasing order of acidic behavior.
- c) Ethyne when passed through red hot iron tube at 873K gives X as the product. X when treated with chloromethane in presence of anhydrous AlCl_3 gives Y. Identify X and Y and write the reactions involved.

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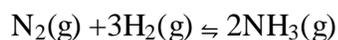
- a) Derive the relation between K_p and K_c .
- b) Calculate the K_p and K_c for the reaction at 3000K



Given $P_{\text{CO}} = 0.4\text{atm}$, $P_{\text{CO}_2} = 0.6\text{atm}$ and $P_{\text{O}_2} = 0.2\text{atm}$. [$R = 0.0821\text{ L atm/K/mol}$]

OR

- a) What do you understand by dynamic equilibrium?
- b) What is the effect of increasing pressure on the following equilibrium?



- c) Calculate the solubility of lead chloride, if its solubility product is 1.7×10^{-5} at 298K.
- d) The pK_a of acetic acid is 4.76 and pK_b of ammonium hydroxide is 4.75. Calculate the pH of ammonium acetate solution.

End of the Question Paper

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