MODEL EXAMINATION, JANUARY - 2020
SUBJECT : CHEMISTRY

Class : XII **Time Allowed : 3 hours** **Maximum Marks: 70**

SET : A

General Instructions:

a) All questions are compulsory.

*b) **Section A:** Question number 1 to 20 are very short answer questions (objective type) and carry 1 mark each.*

*c) **Section B:** Question number 21 to 27 are short answer questions and carry 2 marks each.*

*d) **Section C:** Question number 28 to 34 are long answer questions and carry 3 marks each.*

*e) **Section D:** Question number 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 one mark, two questions of two marks, four 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 calculator is not allowed.

SECTION : A

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

The d block of the periodic table contains the elements of the groups 3-12 in which the d orbitals are progressively filled in each of the four long periods. Transition elements show variable oxidation states, form alloys, coloured ions, complexes and interstitial compounds. They can also act as good catalyst. They have high enthalpies of atomization and high melting and boiling points

1. Transition metals have great tendency for complex formation. Why?
2. Name a transition element which does not exhibit variable oxidation state.
3. Name the catalyst used in contact process.
4. Zn^{2+} salts are white while Cu^{2+} salts are coloured.
5. Chromium group elements (Cr, Mo, W) are hard metals and have highest boiling point. Account.

Questions 6 to 10 are one word answers.

6. Name the method used for refining of Nickel.

7.A Name the deficiency disease caused due to the lack of vitamin B_6.

OR

7.B Name the base that is present only in DNA.

8. Name the linkage that exist between two monosaccharide units in a polysaccharide.

9. Name a synthetic polymer which is an amide.

10. What is tollen's reagent?

Questions 11 to 15 are multiple choice questions.

11. The IUPAC name of the compound shown below is

$$CH_2=C(CH_3)-CH_2Br$$

a) 1-bromo-2-methyl prop-3-ene

b)3-bromo-2-methylprop-1-ene

c) 1-bromo-4-chloro but-1-ene

d) 3 – bromo- but – 1-ene

12. When one mole of $CoCl_3.6H_2O$ was treated with excess of silver nitrate solution, 2 mol of AgCl was precipitated. The formula of the compound is:

a) $[Co(H_2O)_5Cl].Cl_2.H_2O.$ b) $[Co(H_2O)_6]Cl_3$

c) $[Co(H_2O)_4Cl_2]Cl.(H_2O)_2$ d) $Co(H_2O)_3Cl_3](H_2O)_3$

13. Which of the following ligand has lowest (Δo) value?

a) CN^- b) CO c) $\bar{F}$ d) NH_3

14. $[Ni(Cl)_4]^{2-}$ ion is paramagnetic and it involves the following hybridization

a) dsp^2 b) sp^3d^2 c) sp^3d d) sp^3

15.A The incorrect statement about PHBV is

a) It is a biodegradable polymer

b) It is a polyester

c) It is used in controlled release of drugs

d) It is an addition polymer.

OR

15.B Identify the monomers of Nylon 6,6 from the following

a) Hexamethylene diamine and Adipic acid

b) Buta-1, 3-diene and styrene

c) Phthalic acid and ethylene glycol

d) Acrylonitrile and adipic acid

Questions 16 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 statements, but reason is not the correct explanation of the assertion.

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

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

16. **Assertion :** The sum of mole fractions of all components of a solution is unity.
Reason: Mole fraction is independent of temperature.

17. **Assertion :** For complex reactions molecularity and order are not same.
Reason : Order of a reaction may be zero.

18. **Assertion :** Ozone is a powerful oxidizing agent in comparison to O_2.
Reason : Ozone is diamagnetic but O_2 is paramagnetic.

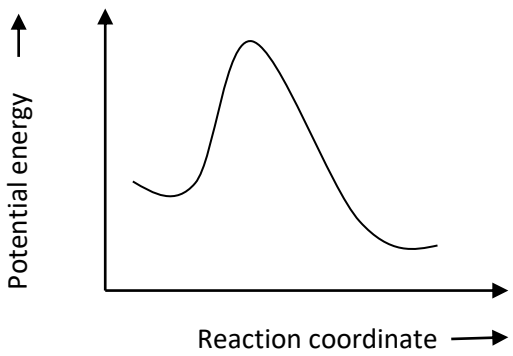
19. **Assertion :** 1-iodopropane and 2-iodopropane are chain isomers.
Reason : They differ in the position of Iodine in the carbon chains.

20. **Assertion :** Alcohols have higher boiling points than ethers of comparable molecular masses.
Reason : Alcohols and ethers are isomeric compounds

SECTION:B

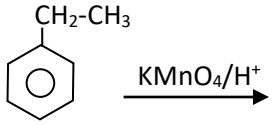
21. **Give reasons for the following:**
a) At high altitudes, people suffer from a disease called anoxia and they become weak and cannot think clearly.
b) When mercuric iodide is added to an aqueous solution of KI, the freezing point is raised.

22. Answer the following questions on the basis of the given plot of potential energy Vs reaction co-ordinate.
a) What is the threshold energy for the reaction?
b) What is the activation energy for the forward reaction?



23.A Write structure of the products formed.

a) $CH \equiv CH \xrightarrow{Hg^{2+},\ H_2SO_4}$

b) 

OR

23.B How do you obtain

a) ethane from ethanal

b) methane from ethanoic acid

24. a) Write the hybridization and magnetic character of $[Co(NH_3)_6]^{3+}$

b) Give the d orbital occupation and co-ordination number of central metal ion in $[Mn(H_2O)_6]SO_4$

25.A Write the chemical reactions that take place in the electrolytic reduction of Al_2O_3.

OR

25.B Describe the role of

a) Zinc metal in the extraction of silver.

b) Silica in the extraction of copper.

26. a) How do you explain the presence of an aldehydic group in glucose molecule?

b) What are the products of hydrolysis of lactose?

27. **Account for the following:**

a) Vinyl chloride is unreactive in nucleophilic substitution reaction.

b) Grignard reagents should be prepared under anhydrous conditions.

SECTION : C

28.A An aqueous solution of 2% non-volatile solute exerts a pressure of 1.004 bar at the boiling point of the solvent. What is the molecular mass of the solute?

OR

28.B Find the boiling point of a solution containing 0.520 g of glucose ($C_6H_{12}O_6$) dissolved in 80.2g of water. [Given K_b for water = 0.52K $Kgmol^{-1}$]

29.A The rate of reaction $2NO+Cl_2 \rightarrow 2NOCl$ is doubled when concentration of Cl_2 is doubled and it becomes eight times when concentration of both NO and Cl_2 are doubled. Deduce the order of the reaction?

OR

29.B A first order reaction is 20% complete in 5min. Calculate the time taken for the reaction to be 60% complete.

30. a) Write the dispersed phase and dispersion medium of smoke.
b) Why cottrell's smoke precipitator is fitted at the mouth of the chimney used in factories? c) Define peptization.

31.A a) What is meant by limiting molar conductivity?
b) Write the overall reaction that occurs during the use of mercury cell.
c) How does conductivity for the solution of an electrolyte vary with concentration? Explain.

OR

31.B a) State one merit and one demerit of nickel cadmium cell over lead storage cell.
b) Predict the products of electrolysis of dilute solution of H_2SO_4 with platinum electrodes.
c) Alkaline medium inhibits the rusting of iron. Give reason.

32. Identify the product formed when ethanol is treated with Con.H_2SO_4 at 443K. Write the mechanism involved for the above reaction.

33. a) Give chemical test to distinguish between the following pair of compounds.
i) Penta-2-one and pentan-3-one ii) Benzaldehyde and benzophenone
b) Describe Hell-Volhard Zelinsky reaction.

34.A a) Name the chemicals responsible for the antiseptic properties of dettol.
b) What are non-narcotic analgesics? Give one example.
c) Why is use of aspartame limited to cold foods and drinks?

OR

34.B a) Why are cemetidine and ranitidine better antacids than sodium bicarbonate or magnesium or aluminium hydroxide?
b) Which category of the synthetic detergent is used in hair conditioners? Define it.
c) What are competitive inhibitors?

SECTION : D

35.A a) i) Formulate the electrochemical cell representing the reaction

$$2Cr_{(s)} + 3Fe^{2+}_{(aq)} \rightarrow 2Cr^{3+}_{(aq)} + 3Fe_{(s)}$$

ii) Calculate E^o_{cell}
iii) Calculate E_{cell} at 25° C if $[Cr^{3+}]$ = 0.1M and
$[Fe^{2+}]$ = 0.01 M

Given $E^o_{Cr^{3+}/Cr} = -0.74V$. $E^o_{Fe^{2+}/Fe} = -0.44V$.

b) The chemistry of corrosion of iron is essentially an electrochemical phenomenon. Explain the reactions occurring during the corrosion of iron in the atmosphere.

OR

35.B a) The molar conductivity of 0.025 $molL^{-1}$ methanoic acid is 46.1Scm^2mol^{-1}. Calculate its degree of dissociation and dissociation constant. Given $\lambda^o_{(H^+)}$ = 349.6Scm^2mol^{-1}.

and $\lambda^o_{(HCOO^-)}$ = 54.6Scm^2mol^{-1}

b) How much electricity in terms of Faraday is required in produce 20.0 g of Ca from molten $CaCl_2$?

c) Following reactions occur at cathode during the electrolysis of aqueous silver chloride solution.

$Ag^+_{(aq)} + \bar{e} \rightarrow Ag_{(s)}$ E^o = 0.80V.

$H^+_{(aq)} + \bar{e} \rightarrow \frac{1}{2}H_{2(g)}$ E^o=0.00V.

On the basis of their standard reduction electrode potential (E^o) values, which reaction is feasible at the cathode and why?

36.A a) Draw the structures of the following compounds

i) H_2SO_3 ii) $XeOF_4$

b) Assign reasons for the following:

i) OF_6 compound is not known

ii) Helium is used in diving apparatus.

iii) Hydrogen fluoride has a much higher boiling point than hydrogen chloride.

OR

36.B a) Complete the following chemical equations.

i) $Fe^{3+} + SO_2 + H_2O \rightarrow$

ii) $XeF_2 + H_2O \rightarrow$

b) Draw the structure of XeF_4 molecule.

c) Write the conditions to maximise the yield of H_2SO_4 by contact process.

d) Why is ClF_3 more reactive than Cl_2?

37.A a) **Account for the following:**

i) Aniline does not undergo Friedel – crafts reaction.

ii) Amines are less acidic than alcohols of comparable molecular masses.

b) Give a chemical test to distinguish between methylamine and dimethylamine.

c) Identify A and B in the following reaction.

$$C_6H_5NH_2 \xrightarrow[0-5^oC]{NaNO_2/HCl} A \xrightarrow{H_2O} B.$$

d) Arrange the following compounds in the increasing order of basic strength in gas phase.

$C_6H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$, $C_2H_5NH_2$

OR

37.B A hydrocarbon `A' ($C_4H_8$) on reaction with HCl gives a compound `B' (C_4H_9Cl) which on reaction with 1 mol of NH_3 gives compound `C' ($C_4H_{11}N$). On reaction with $NaNO_2$ and HCl followed by treatment with water, compound `C' yields an optically active alcohol `D'. Ozonolysis of A gives 2 moles of acetaldehyde.

Identify the compounds `A' to `D'. Explain the reactions involved.

THE END

XII PA2, NOVEMBER 2019

NAME	SUBJECT	DATE