FIRST PRE-BOARD EXAMINATION (2019-2020)

CLASS: XII

Subject: CHEMISTRY **Date: 12.12.2019**

Time allowed: 3 Hours. Maximum Marks: 70

General Instructions

(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.
(h) Please check this question paper contains **11** printed pages only.
(i) Please check that this question paper contains 3**7** questions.

SECTION - A

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

The splitting of d orbital energies and its effects form the basis of crystal field theory. The five d-orbitals in an isolated gaseous metal atom/ion are degenerate. If a spherically symmetric field of negative charges is placed around the metal, the orbitals will remain degenerate, but all of them will be raised in energy as a result of repulsion between the negative field and the electrons in the orbitals. If the field results from the influence of real ligands (either anions or the negative ends of dipolar ligands), the symmetry of the field will be less than spherical and the degeneracy of the d-orbitals will be removed.

1. Write the IUPAC name of $[Co(CN)_2(NH_3)_4]C\ell$ 1

2. $[Cr(NH_3)_6]^{+3}$ is paramagnetic while $[Ni(CN)_4]^{-2}$ is diamagnetic. Explain why? 1

3. $[Fe(CN)_6]^{-4}$ and $[Fe(H_2O)_6]^{+2}$ are of different colours in dilute solutions. Why? 1

4. Draw the structures of geometrical isomers of the coordination complex. 1

   $[CoCl_2(en)_2]^+$

5. Calculate the oxidation number and coordination number of central atom in $[Co(C_2O_4)_3]^{-3}$. 1

   [At. No.: Cr=24, Fe=26, Co=27, Ni=28]

Questions 6 to 10 are one word answers:

6. Name a chemical used as an antiseptic as well as disinfectant. 1

7. Give an example for biodegradable polymer. 1

8. Name the carbohydrate used as storage molecule to store energy in animals. 1

9. Name the method of refining of nickel? 1

10. Mention one shape–selective catalyst used to convert alcohol into gasoline. 1

Questions 11 to 15 are multiple choice questions:

11. Which of the following is incorrect? 1

   (A) Relative lowering of vapour pressure is independent of the nature of the solute and the solvent.

   (B) The vapour pressure in not a colligative property.

   (C) Vapour pressure of a solution is lower than that of the solvent.

   (D) The relative lowering of vapour pressure is directly proportional to the original pressure.

12. For a reaction, the rate of reaction was found to increase about 1.8 times when the temperature was increased by 10°C. The increase in rate is due to: 1

(A) increase in number of active molecules

(B) increase in activation energy of reactants

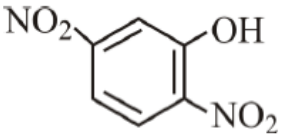
(C) decrease in activation energy of reactants

(D) increase in the number of collisions between reacting molecules

13. The best reagent for converting, 2-phenylpropanamide into 1-phenylethanamine is: 1

(A) Excess H_2/Pt
(B) NaOH/Br_2
(C) $NaBH_4$/methanol
(D) $LiA\ell H_4$/ether

14. Write the IUPAC name of the given compound 1



(A) 1-Hydroxy-2,5 – dinitrobenzene

(B) 1, 4 - dinitrophenol

(C) 2, 5 - dinitrophenol

(D) 2,5- Dinitro 1-hydroxy benzene

15. Among the electrolytes Na_2SO_4, $CaC\ell_2$, $A\ell_2(SO_4)_3$ and $NH_4C\ell$, the most effective coagulating agent for Sb_2S_3 sol is 1

(A) Na_2SO_4
(B) $CaC\ell_2$
(C) $A\ell_2(SO_4)_3$
(D) $NH_4C\ell$

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 : Reverse osmosis is used in the desalination of sea water. 1

Reason : When pressure more than osmotic pressure is applied, pure water is squeezed out of the sea water through the membrane.

17. Assertion : Galvanic cells containing hydrogen, methane, methanol etc. as fuels are called fuel cells. 1

Reason : They are designed to convert the energy of combustion of fuels directly into electrical energy.

18. Assertion : Ethyl xanthate is used as a collector in froth floatation process . 1

Reason : Collectors depress the floatation property of one of the components of the ore and thus help in the separation of different minerals present in the same ore.

19. Assertion : Transition metals show variable valence. 1

Reason : Due to a large energy difference between the ns and (n-1)d electrons.

20. Assertion : The S – S – S bond angle in S_8 molecule is 105°. 1

Reason : S_8 has a V-shape

SECTION : B

21. (a) Write the cell reaction which occur at cathode and anode in the lead storage battery. 2

(b) Conductivity of CH_3COOH decreases on dilution.Why?

22. (a) What is the effect of change in temperature on the extent of physical and chemical adsorption. 2

(b) Define the term peptization and also mention its cause.

23. The experimental data for the reaction, $2A + B_2 \longrightarrow 2AB$, are as follows. Write probable rate expression. 2

[A] (mol/L)	$[B_2]$ (mol/L)	Initial rate (mol L^{-1} sec^{-1})
0.5	0.5	1.6×10^{-4}
0.5	1.0	3.2×10^{-4}
1.0	1.0	3.2×10^{-4}

OR

Show that time required for 99.9% completion of the first order reaction is 10 times of $t_{\frac{1}{2}}$ for first order chemical reaction.

24. (a) What is pyrometallurgy? Give one example. 2

(b) What is the role of cryolite in metallurgy of Aℓ?

25. (a) How is XeO_3 prepared from XeF_6. Write the chemical equation for the reaction. 2

(b) Draw the structure of XeF_6 using VSEPR theory. [At. No.: Xe=54, F=9]

OR

(a) Why is HI stronger acid than HCℓ ?

(b) Why is the single O-O bond weaker than single S-S bond?

26. (a) Which compound in the following pair will reach faster in S_N2 reaction with OH^-? Give reason 2

CH_3-CH_2-CH_2-Cℓ or CH_3-CH(Cℓ)-CH_3

(b) Explain Finkelstein reaction with example.

27. (a) Give one example each of bactericidal and bacteriostatic antibiotic. 2

(b) Which sweetening agent is used in the preparation of sweets for diabetic patients?

SECTION: C

28. (a) Osmotic pressure is considered to be a colligative property. Why? 3

(b) What is the molar concentration of particles in human blood if the osmotic pressure is 7.2 atm. at normal body temperature of 37°C? [R=0.0821 L-atm/mol-K]

29. (a) Define the term 'energy of activation'. 3

(b) The energy of activation for a chemical reaction is 100 kJ/mol. Presence of a catalyst lowers the energy of activation by 75%. What will be effect on the rate of reaction at 20°C, if other things are equal. [R=8.314 J/mol-K]

OR

(a) Rate constant for a first order reaction has been found to be $2.54 \times 10^{-3}\ s^{-1}$. Calculate its three-fourth life.
[Given : log 2 = 0.3010]

(b) A reaction is first order in A and second order in B. How is the rate affected when concentration of both A and B are doubled.

30. (a) Interhalogen compounds are more reactive than halogens. Why? 3

(b) What happens when SO_2 gas is passed through an aqueous solution of Fe^{3+} salt?

(c) Compare the oxidising powers of F_2 and $C\ell_2$ on the basis of bond enthalpy.

31. Account for the following : 3

(a) Transition metals form complexes.

(b) Ce^{3+} can be easily oxidised to Ce^{4+}. [At. No. of Ce = 58]

(c) Actinoids displays variety of oxidation states.

32. Explain why : 3

(a) Aniline can not be prepared by Gabriel phthalimide synthesis.

(b) Why does diazonium ion act as an electrophile? Give example of a reaction where diazonium ion acts as an electrophile.

(c) $(CH_3)_3C–NH_2$ has a lower boiling point than $CH_3CH_2CH_2CH_2 – NH_2$ although both are isomeric in nature.

OR

(a) Describe the following reactions giving an example of each :

(i) Gabriel Phthalimide Synthesis

(ii) Carbylamine reaction

(b) Write the structures of the compounds A and B in the following reaction:

$$C_6H_5N_2^+BF_4^- \xrightarrow[\Delta]{NaNO_2/Cu} A \xrightarrow{Fe/HCl} B$$

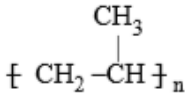
33. Explain: 3

(a) Why is sucrose called invert sugar?

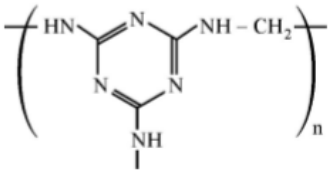
(b) What is the difference between fibrous and globular protien?

(c) Name the vitamin responsible for coagulation of blood.

34. 3

(a) Is  a homopolymer or copolymer? Give reason.

(b) Write the monomers of the following polymer:



(c) Name the monomers for the following polymers:

(i) PAN (ii) Nylon 6,6

SECTION: D

35. (a) State Kohlrausch's law of independent migration of ions. 5

(b) The conductivity of 0.001M CH_3COOH is 4.95×10^{-5} S/cm. Calculate its degree of dissociation . Given for acetic acid, Λ_m^o, is 390.5 S–cm^2 mol^{-1}.

(c) Calculate the emf of the cell,

$$Mg\ (s)\ |\ Mg^{+2}\ (10^{-3}M)\ ||\ Cu^{+2}\ (10^{-4}M)\ |\ Cu$$

[Given : $E^{o}_{Cu^{+2}/Cu}$ = 0.34 V, $E^{o}_{Mg^{+2}/Mg}$ = – 2.375 V]

OR

(a) State Faraday's first law of electrolysis.

(b) Silver is deposited on a metallic vessel of surface area 800 cm^2 by passing current of 0.2 ampere, for 3 hours. Calculate the thickness of silver deposited.

(F = 96500C/mol, Density of silver 10.5 g/cc, At. mass of Ag = 108 amu]

(c) Molar conductivity at infinite dilution for $NH_4C\ell$, NaOH and NaCℓ solution at 298K are respectively 129.8, 218.4 and 108.9 S cm^2mol^{-1} and $\wedge_m$ for 10^{-2} M solution of NH_4OH is 9.33 S–cm^2mol^{-1}. Calculate the degree of dissociation of NH_4OH.

36. (a) Identify X and Y in the following sequence of reactions : 5

(i) $C_6H_5OH \xrightarrow{Zn\ dust} X \xrightarrow{CH_3Cl,\ Anhy.\ AlCl_3} Y$

(ii) $CH_3\text{-}CH_2\text{-}OH \xrightarrow{PBr_3} X \xrightarrow{Alc.\ KOH} Y$

(b) Write the mechanism of hydration of ethene to yield ethanol.

(c) Nitrophenol is more acidic than o-methoxyphenol. Explain.

OR

(a) Sulphuric acid is not used in the reaction of alcohol with Kl.

(b) What happens when :

(i) Cumene is oxidised in the presence of air and the product formed is treated with dilute acid.

(ii) Phenol is treated with chloroform in presence of dilute NaOH.

(c) What is the function of $ZnC\ell_2$ (Anhy.) in Lucas test for distinction between 1°, 2° and 3° alcohols.

(d) Complete the following reactions :

$$C_6H_5 - O - CH_3 + HI \longrightarrow$$

37. (a) Give the chemical tests to distinguish between following pair of compounds : 5

(i) Ethanal and Propanal

(ii) Benzaldehyde and Acetophenone

(b) How will you convert :

(i) benzene to benzaldehyde

(ii) acetylene to acetic acid

(c) Arrange the following in the increasing order of reactivity towards nucleophilic addition reaction :

HCHO, CH_3CHO and CH_3COCH_3

OR

(a) Identify A and B of the following reactions:

$$CH_3CHO \xrightarrow{KMnO_4/H^+} A \xrightarrow{Cl_2/\text{Red P}} B$$

(b) Electrophilic substitution in benzoic acid takes place at m-position.Why?

(c) Draw the structure of product formed when propanal is treated with zinc amalgam and concentrated hydrochloric acid.

(d) Complete the following reaction:

$$CH_3\text{-}CHO \xrightarrow{\text{Dil NaOH, } \Delta}$$