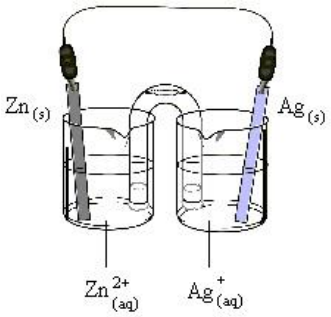
INDIAN SCHOOL SOHAR
TERM I EXAMINATION 2019-2020
CHEMISTRY

CLASS : XII **MAX MARKS :70**
DATE : 26.10.2019 **TIME : 3.00 HRS**

(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 long answer questions and carry 5 marks each.
(f) There is no overall choice. However an internal choice has been provided in two questions in 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

Consider the figure given and answer the questions 1 to 5 from that:



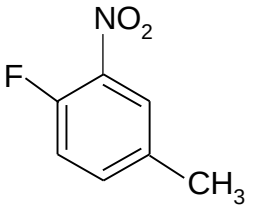
1. Write the direction of electron flow.
2. Is silver plate the anode or cathode?
3. What will happen if salt bridge is removed?
4. When will the cell stop functioning?
5. How will concentration of Zn^{2+} ions and Ag^{+} ions be affected when the cell function?

Questions 6 to 10 are one word or one sentence answers:

6. Name the method used for refining zirconium.
7. What is slag?
8. What is sorption?
9. Arrange the following compounds in the increasing order of their acid strengths:
   4-nitrophenol, phenol, 2,4,6-trinitrophenol
10. Name the aldehyde which does not give Fehling's solution test.

Questions 11 to 15 are multiple choice questions:

11. The IUPAC name of the compound



(a) 4-Fluoro-1-methyl-3-nitrobenzene
(b) 1-Fluoro-4-methyl-2-nitrobenzene
(c) 2-Fluoro-5-methyl-1-nitrobenzene
(d) 4-Methyl-1-fluoro-2-nitrobenzene

12. The stabilisation coordination compounds due to chelation is called the chelate effect. Which of the following is the most stable complex species?

(a) $[Fe(CO)_5]$ (b) $[Fe(CN)_6]^{3-}$ (c) $[Fe(C_2O_4)_3]^{3-}$ (d) $[Fe(H_2O)_6]^{3+}$

13. Which of the following statement is correct?
    (a) Higher CFSE favours formation of high spin complex
    (b) Lower CFSE favours formation of low spin complex
    (c) t_{2g} orbital are three fold degenerate whereas e_g orbitals are two fold degenerate.
    (d) A particular metal ion in a particular oxidation state can form either diamagnetic complexes only or paramagnetic complexes only.
14. Atomic number of Mn, Fe, Co and Ni are 25,26,27 and 28 respectively. Which of the following outer orbital octahedral complexes have same number of unpaired electrons?
    (a) $[MnCl_6]^{3-}$ (b) $[FeF_6]^{3-}$ (c) $[CoF_6]^{3-}$ (d) $[Ni(NH_3)_6]^{2+}$
15. If chlorine gas is passed through hot NaOH solution, two changes are observed in the oxidation number of chlorine during the reaction. These are _____ and _____.
    (a) 0 to +5 (b) 0 to +3 (c) 0 to -1 (d) 0 to +1

Question 16 to 20:

(a) Assertion and reason both are correct statements; reason is correct explanation for assertion.
(b) Assertion and reason both are correct statements; reason is not correct explanation for assertion.
(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.

16. **Assertion** : All collisions of reactant molecules lead to product formation.
    Reason : Only those collisions in which molecules have correct orientation and sufficient kinetic energy lead to compound formation.
17. **Assertion** : Lowering of vapour pressure is directly proportional to osmotic pressure of the solution.
    Reason : Osmotic pressure is a colligative property.
18. **Assertion** : HClO is stronger acid than HBrO.
    Reason : Greater is the electronegativity of the halogen, greater will be attraction of electron pair towards it and hence more easily the H^+ ion will be released.
19. **Assertion** : Ethanol is a weaker acid than phenol.
    Reason : Sodium ethoxide may be prepared by the reaction of ethanol with aqueous NaoH.
20. **Assertion** : It is difficult to replace chlorine by –OH in chlorobenzene in comparison to that in chloroethane.
    Reason : Chlorine-Carbon (C-Cl) bond in chlorobenzene has a partial double bond character due to resonance.

SECTION B

21. Draw the structures of the following: (i) $H_2S_2O_7$ (ii) XeF_6
22. The rate law for the reaction Ester + $H^+ \rightarrow$ Acid + alcohol is: $\frac{dx}{dt} = k[Ester][H^+]^0$
    What would be the effect on the rate if (i) Concentration of the ester is doubled? (ii) Concentration of H^+ doubled?
23. Derive the relationship between relative lowering of vapour pressure and molar mass of the solute.
24. Write the equations involved in the following reactions:
    (i) Wolff-Kishner reduction (ii) Etard reaction

25. For the complex $[Fe(CO)_5]$, write the hybridisation, magnetic character and spin of the complex. (At. Number of Fe = 26)

OR

What is meant by crystal field splitting energy? On the basis of crystal field theory, write the electronic configuration of d^4 in terms of t_{2g} and e_g in an octahedral field when (i) $\Delta_0 > P$ (ii) $\Delta_0 < P$.

26. The extraction of Au by leaching with NaCN involves both oxidation and reduction. Justify giving equation.

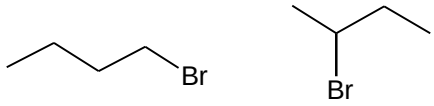
OR

Describe the principle involved in each of the following processes:

(i) Mond process for refining of Nickel

(ii) Column chromatography for purification of rare elements.

27. (i) Which alkyl halide from the following pair is chiral and undergoes faster S_N2 reaction?



(a) (b)

(ii) Out of S_N1 and S_N2, which reaction occurs with

(a) Inversion of configuration (b) Racemisation

SECTION C

28. A solution of glucose (Molar Mass = 180 $gmol^{-1}$) in water has boiling point of 100.20^0C. Calculate the freezing point of the same solution. Molal constants for water K_f and K_b are 1.86 $Kkgmol^{-1}$ and 0.512 $Kkgmol^{-1}$ respectively.

29. Following data are obtained for the reaction: $N_2O_5 \rightarrow 2NO_2 + ½\ O_2$

t/s	0	300	600
$[N_2O_5]/molL^{-1}$	1.6×10^{-2}	0.8×10^{-2}	$^{0.4}\ \times 10^{-2}$

(i) Show that it follows first order reaction.

(ii) Calculate the half-life. (Given log 2 = 0.3010, log 4 = 0.6021)

OR

The rate constant for the first order decomposition of H_2O_2 is given by the following equation:

$\log k = 14.2 - \frac{1.0 \times 10^4}{T} K$

Calculate E_a for this reaction and rate constant k if its half-life period be 200 minutes. (Given: R= 8.314 $JK^{-1}mol^{-1}$)

30. Define the following terms:

(i) Brownian movement

(ii) Peptization

(iii) Multimolecular colloids

31. How would you account for the following?

(i) The electron gain enthalpy with negative sign is less for oxygen than that for sulphur.

(ii) Fluorine never acts as the central atom in polyatomic interhalogen compounds.

(iii) H_2S has lower boiling point than H_2O

32. Complete the following reactions:

(i) $CH_3CH_2CH_2OCH_3 + HBr \rightarrow$

(ii) $C_6H_5OC_2H_5 + HBr \rightarrow$

(iii) $(CH_3)_3C\text{-}O\text{-}C_2H_5 + HI \rightarrow$

33. How would you bring about the following conversions? Write the complete equation in each case.

(i) Ethanal to 3-Hydroxybutanal

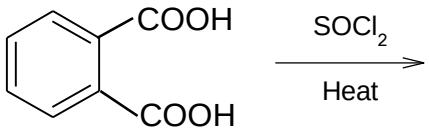
(ii) Benzoic acid to m-nitrobenzyl alcohol

(iii) Benzaldehyde to benzophenone

OR

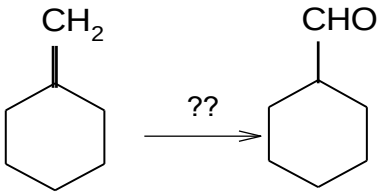
Complete each synthesis by giving missing reagents or products in the following:

(i)



(ii) $C_6H_5CHO \xrightarrow{H_2NCONHNH_2}$

(iii)



34. Three electrolytic cells A, B and C containing solutions $ZnSO_4$, $AgNO_3$ and $CuSO_4$, respectively were connected in series. A steady current of 1.5 A was passed through them until 1.45 g of silver deposited at the cathode of cell B. How long did the current flow? What mass of copper and zinc were deposited? [At. Mass of Ag = 108; Cu = 63.5; Zn = 65.3]

SECTION D

35. Calculate emf and ΔG for the following cell at 298 K:

$Mg(s)|Mg^{2+}(0.01M)||Ag^{+}(0.0001M)|Ag$ Given: $E^0(Ag^+/Ag) = 0.80$ V; $E^0(Mg^{2+}/Mg) = -2.37$V)

OR

(i) What type of battery is lead storage battery? Write the anode and cathode reactions and the overall cell reaction occurring in the operation of a lead storage battery.

(ii) Calculate the potential for half-cell containing

0.1M $K_2Cr_2O_7(aq)$, 0.20 M $Cr^{3+}(aq)$ and 1.0 x 10^{-4}M $H^+(aq)$. The half cell reaction is

$Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6e^- \rightarrow 2Cr^{3+}(aq) + 7H_2O(l)$

And the standard electrode potential is given as $E^0 = 1.33$ V.

36. An aromatic compound 'A' of molecular formula C_7H_7ON undergoes a series of reactions as shown below. Write the structures of A, B, C, D and E in the following reactions:

$C_7H_7ON \xrightarrow{Br_2+KOH} C_6H_5NH_2 \xrightarrow{NaNO_2+HCl/273\ K} B \xrightarrow{CH_3CH_2OH} C$

$C_6H_5NH_2 \xrightarrow{CHCl_3+NaOH} D$

$B \xrightarrow{KI} E$

OR

(i) Write the structures of main products when aniline reacts with the following reagents:

(a) Br_2 water (b) HCl (c) $(CH_3CO)_2O$/Pyridine

(ii) Arrange the following in the increasing order of their boiling point:

$C_2H_5NH_2$, C_2H_5OH, $(CH_3)_3N$

(iii) Give simple chemical test to distinguish between the following pair of compounds:

$(CH_3)_2NH$ and $(CH_3)_3N$

37. When an oxide of manganese (A) is fused with KOH in the presence of an oxidising agent and dissolved in water, it gives a dark solution of compound (B). Compound (B) disproportionates in neutral or acidic solution to give purple compound (C). An alkaline solution of compound (C) oxidises potassium iodide solution to a compound (D) and compound (A) is also formed. Identify compounds A to D and also explain the reactions involved.

OR

(a) Complete and balance the following chemical equations:

(i) $Cr_2O_7^{2-} + I^- + H^+ \rightarrow$

(ii) $MnO_4^- + SO_3^{2-} + H^+ \rightarrow$

(b) Explain the following observations:

(a) Transition elements and their compounds are known to act as catalysts.

(b) The higher oxidation states are usually exhibited by the members in the middle of a series of transition elements.

(c) The metal-metal bonding is more frequently found with the second and third series of transition elements.