SET – 3
Subject Code: 043

COMMON PRE-BOARD EXAMINATION 2017-2018

CHEMISTRY

CLASS XII

Time Allowed: 3 hours Maximum Marks: 70

General Instructions:

*(i) There are **26** questions in **all. All** questions are compulsory.*

*(ii) Questions number**1** to **5** are very short-answer questions and carry **1** mark each.*

*(iii) Questions number **6** to **10** are short-answer questions and carry **2** marks each.*

*(iv) Questions number **11** to **22** are also short-answer questions and carry **3** marks each*

*(v) Question **23** is a value based question and carries **4** marks*

*(vi) Questions number**24** to **26** are long-answer questions and carry **5** marks each.*

*(vii) Use log tables, if necessary. Use of calculators is **not** allowed.*

Number of printed pages – 6

1 Draw the noble gas species isostructural with BrO_3^-. 1

2 How can a colloidal solution and true solution of the same colour be distinguished from each other? 1

3 Write structural formula of the following organic compound: 1
4-Chloropentan-2-one

4 Write chemical equation for the reaction of propanone with methylmagnesium bromide followed by hydrolysis. 1

5 What makes alkali metal halides sometimes coloured, which are otherwise colourless? 1

6 Draw structures of the following: 2
(a) PCl_5 (gas) (b) $H_2S_2O_8$

7 Arrange the following in decreasing order of their basic strength: 2

(a) $C_6H_5NH_2$, $C_2H_5NH_2$, $(C_2H_5)_2NH$, NH_3

(b) Aniline, p-nitroaniline and p-toluidine

OR

Describe Hinsberg method for the identification of primary, secondary and tertiary amines. Also write the chemical equations of the reactions involved.

8 What is meant by negative deviation from Raoult's law? Draw a diagram to illustrate the relationship between vapour pressure and mole fraction of components in a solution to represent negative deviation. 2

9 Write the IUPAC names of the following complexes: 2

(a) $[Cr(CN)_6]^{3-}$

(b) $K_4[Fe(CN)_6]$

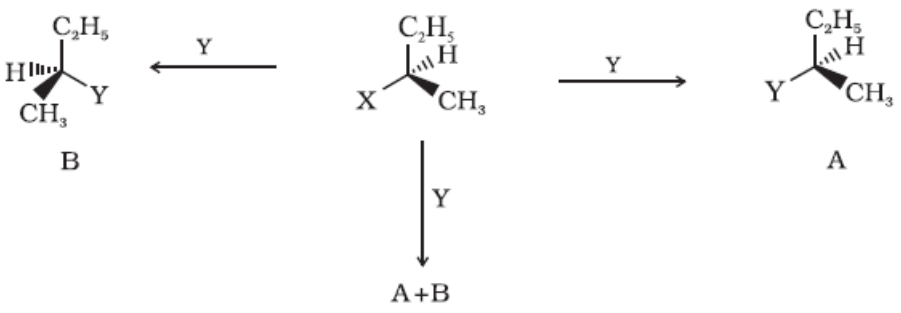
10 For a reaction : $2NH_{3(g)} \xrightarrow{Pt} N_{2(g)} + 3H_{2(S)}$ 2

Rate = k

(i) Write the order and molecularity of this reaction.

(ii) Write the unit of k.

11 There are three products possible in the following nucleophilic substitution reaction taking place at asymmetric carbon. 3



Name the process if:

(a) A is the only product formed.

(b) B is the only product formed.

(c) A and B both are formed

12 Calculate the osmotic pressure at 25°C and freezing point of 1.8% glucose (molar mass = 180 g/mol) solution. Assume ideal behavior of the solution. Take density to be 1g/ml, K_f of water 1.86Kkg/mol and R=0.0821L atm/K/mol. 3

13 Give plausible explanation for each of the following: 3

(a) Why are amines less acidic than alcohols of comparable molecular masses?

(b) Why do primary amines have higher boiling point than tertiary amines?

(c) Why are aliphatic amines stronger bases than aromatic amines?

14 Explain what happens when: 3

(a) An electrolyte is added to ferric hydroxide sol?

(b) Ferric chloride is added to freshly precipitated ferric hydroxide?

(c) Electric current is passed through a sol?

OR

Differentiate between:

(a) Physisorption and chemisorption.

(b) Coagulation and peptization.

(c) Lyophilic and lyophobic sols.

15 Write the chemical equations involved in the following reactions: 3

(a) Reimer - Tiemann reaction

(b) Kolbe's reaction

(c) Williamson synthesis

16 A first order reaction takes 600 seconds for 25% decomposition. Calculate half-life for the reaction. 3

(Given : log 2 = 0·3010, log 3 = 0·4771, log 4 = 0·6021)

17 Write the principles of the following: 3

(a) Vapour phase refining

(b) Zone refining

(c) Chromatography

18 Niobium crystallises in body-centred cubic structure. If it's density is 8.55 g/cm^3, calculate atomic radius of niobium using its atomic mass 93u. 3

19 Give reasons: 3

(a) Chlorine is a permanent bleach but SO_2 is a temporary bleach.

(b) Noble gases have low boiling points.

(c) H_3PO_2 is a good reducing agent.

20 (a) Name the nitrogeneous base in which DNA differs from RNA. 3

(b) What are basic amino acids?

(c) Name the vitamin whose deficiency causes bleeding gums.

21 (a) Give one example of ionization isomerism. 3

(b) Give reasons:

(i) Tetrahedral complexes do not show geometric isomerism.

(ii) Co^{2+} is easily oxidized to Co^{3+} in the presence of strong ligands.

22 Draw structures and name the monomers of the following polymers: 3

(a) Neoprene

(b) Buna-N

(c) Nylon 6,6

23 Due to hectic and busy schedule, Mr. Angad made his life full of tensions and anxiety. He started taking sleeping pills to overcome the depression without consulting the doctor. Mr. Deepak, a close friend of Mr. Angad, advised him to stop taking sleeping pills and suggested to change his lifestyle by doing Yoga, meditation and some physical exercise. Mr. Angad followed his friend's advice and after few days he started feeling better. 4

After reading the above passage, answer the following :

(i) What are the values (at least two) displayed by Mr. Deepak ?

(ii) Why is it not advisable to take sleeping pills without consulting a doctor ?

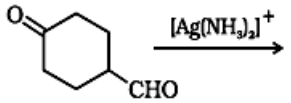
(iii) What are tranquilizers? Give two examples.

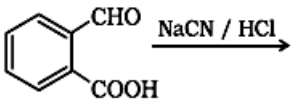
24 (a) How will you convert the following: 5

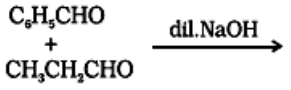
(i) Ethyl benzene to benzoic acid?

(ii) Toluene to benzaldehyde?

(b) Complete the following reactions:

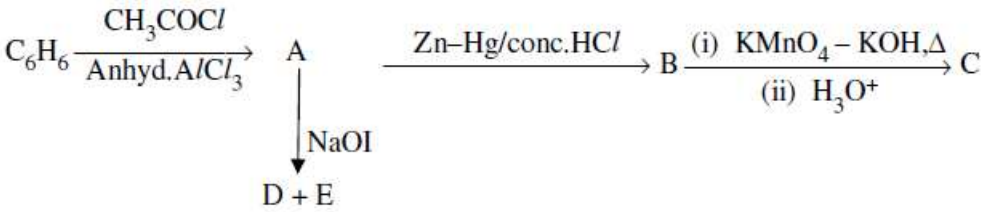
(i) 

(ii) 

(iii) 

OR

Write the structures of A, B, C, D and E in the following reactions:



25 (a) What is lanthanoid contraction? Give its consequences. 5

(b) Which of these ions are stable in aqueous solutions?:

(i) Cr^{3+} (ii) Mn^{2+} (iii) V^{3+} (iv) Fe^{2+}

(c) Give reasons:

(i) The first ionization enthalpy values show irregularity across the first transition series.

(ii) Cu is the only transition element in the 3d series with positive E^0 value.

(iii) Actinoid contraction is greater from element to element than lanthanoid contraction.

OR

(a) Describe the preparation of $KMnO_4$ from pyrolusite ore.

(b) Complete the following equations:

(i) $MnO_4^- + Fe^{2+} \rightarrow$

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

(iii) $CrO_4^{2-} + H^+ \rightarrow$

26 (a) Following reactions occur at cathode during the electrolysis of aqueous copper(II) chloride solution : 5

$$Cu^{2+}_{(aq)} + 2e^{-} \rightarrow Cu_{(S)} \qquad E° = +0.34V$$

$$H^{+}_{(aq)} + e^{-} \rightarrow \frac{1}{2}H_{2(g)} \qquad E° = 0.00V$$

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

(b) State Kohlrausch law of independent migration of ions. Write its one application.

(c) Calculate the equilibrium constant for the reaction

$$Fe_{(s)} + Cd^{2+} \rightleftharpoons Fe^{2+} + Cd_{(S)}$$

Given : $E^{o} \quad Cd^{2+} \ /Cd = -0.40\,V, \quad E^{o} \quad Fe^{2+} \ /Fe = -0.44\,V$

OR

(a) Define molar conductivity of a substance. With the help of graph explain how for weak and strong electrolytes, molar conductivity changes with concentration of solute.

(b) Calculate e.m.f of the following cell at 298 K :

$$2Cr_{(s)} + 3Fe^{2+}_{(0.1M)} \rightarrow 2Cr^{3+}_{(0.01M)} + 3Fe_{(S)}$$

Given : $E^{o} \quad Cr^{3+} \ /Cr = -0.74\,V, \quad E^{o} \quad Fe^{2+} \ /Fe = -0.44\,V$