FIRST PRE BOARD – 2020-21
SUB -CHEMISTRY
CLASS - XII

MM:70 **Time: 3 Hours**

General Instructions. Read the following instructions carefully.

a) There are 33 questions in this question paper. All questions are compulsory.

b) Section A: Q. No. 1 to 2 are case-based questions having four MCQs or Reason Assertion type based on given passage each carrying 1 mark.

c) Section A: Question 3 to 16 are MCQs and Reason Assertion type questions carrying 1 mark each

d) Section B: Q. No. 17 to 25 are short answer questions and carry 2 marks each.

e) Section C: Q. No. 26 to 30 are short answer questions and carry 3 marks each.

f) Section D: Q. No. 31 to 33 are long answer questions carrying 5 marks each.

g) There is no overall choice. However, internal choices have been provided.

h) Use of calculators and log tables is not permitted.

SECTION A (OBJECTIVE TYPE)

1. Read the passage given below and answer the following questions: (1x4=4)

Observe the following table showing boiling points of alcohol, molar mass. Study the table and answer the questions based on table and related studied concept.

Alcohol	Boiling Point	Molar Mass
1. CH_3OH	64°C	32 g mol^{-1}
2. C_2H_5OH	78°C	46 g mol^{-1}
3. C_3H_7OH (*n*-propyl alcohol)	97°C	60 g mol^{-1}
4. Isopropyl alcohol	82.5°C	60 g mol^{-1}
5. *n*-butanol	118°C	74 g mol^{-1}
6. Isobutyl alcohol	108°C	74 g mol^{-1}
7. Butan-2-ol	100°C	74 g mol^{-1}
8. Tert. butyl alcohol	83°C	74 g mol^{-1}

(a) Why does tertiary butyl alcohol have lower boiling point than n-butyl alcohol?

(b) How does boiling point vary with increase in carbon chain?

(c) How is solubility of alcohol vary with increase in molar mass?

(d) Which alcohol is most acidic and why

2. Read the passage given below and answer the following questions: (1x4=

The amount of moisture that leather adsorbs or loses is determined by temperature, relative humidity, degree of porosity, and the size of the pores. Moisture has great practical significance because its amount affects the durability of leather, and in articles such as shoes, gloves, and other garments, the comfort of the wearer. High moisture content accelerates deterioration and promotes mildew action. On the other hand, a minimum amount of moisture is required to keep leather properly lubricated and thus prevent cracking.

The study indicates that adsorption of moisture by leather is a multi-molecular process and is accompanied by low enthalpies of adsorption. Further 75-percent relative humidity the adsorption is a function of surface area alone. Untanned hide and chrome-tanned leathers have the largest surface areas. The leathers tanned with the vegetable tanning materials have smaller surface areas since they are composed of less hide substance and the capillaries are reduced to smaller diameters, in some cases probably completely filled by tanning materials. This process of tanning occurs due to mutual coagulation of positively charged hide with negatively charged tanning material. The result of the study indicated that untanned hide and chrome-tanned leather adsorb the most water vapour.

In these questions (Q. No 5-8 , a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but 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.

p- Assertion: Vegetable tanned leather cannot adsorb a large amount of moisture. Reason: Porous materials have higher surface area.

Q -Assertion: Animal hide soaked in tannin results in hardening of leather. Reason: Tanning occurs due to mutual coagulation.

R - Assertion: Adsorption of moisture by leather is physisorption.

Reason: It is a multimolecular process and is accompanied by low enthalpies of adsorption

S - -Assertion: The vegetable tanning materials have smaller surface areas

Reason: The capillaries present in leather are reduced to smaller diameters

OR

Assertion: Leather absorbs different amount of moisture.

Reason: Some moisture is necessary to prevent cracking of leather.

Following questions (No. 3 -11) are multiple choice questions carrying 1 mark each:

3 Which of the following option will be the limiting molar conductivity of CH_3COOH if the limiting molar conductivity of CH_3COONa is 91 Scm^2mol^{-1}? Limiting molar conductivity for individual ions are given in the following table.

S.No	Ions	limiting molar conductivity / Scm2mol-1
1	H+	350
2	Na+	51
3	K+	74
4	OH-	200

a) 350 Scm^2mol^{-1}

b) 375 Scm^2mol^{-1}

c) 390 Scm^2mol^{-1}

d) 340 Scm^2mol^{-1}

4. Curdling of milk is an example of:

a) breaking of peptide linkage
b) hydrolysis of lactose
c) breaking of protein into amino acids
d) denauration of proetin

OR

Dissachrides that are reducing in nature are:

a) sucrose and lactose
b) sucrose and maltose
c) lactose and maltose
d) sucrose, lactose and maltose

5. Calculate the molarity of solution containing 5gm of NaOH in 450 ml solution

a) 0.278 M
b) 0.378 M
c) 2.78 M
d) 3.78 M

6. Which of the following is the reason for Zinc not exhibiting variable oxidation state

a) inert pair effect
b) completely filled 3d subshell
c) completely filled 4s subshell
d) common ion effect

OR

Which of the following is a diamagnetic ion: (Atomic numbers of Sc, V, Mn and Cu are 21, 23, 25 and 29 respectively)

a) V^{2+}
b) Sc^{3+}
c) Cu^{2+}
d) Mn^{3+}

7. Butananamide on reaction with bromine in aqueous NaOH gives:

a) Propanamine
b) Ethanamine
c) N-Methyl ethanamine
d) Propanenitrile

OR

Reaction of Acetamide with $LiAlH_4$ give

a) Ethanamine
b) Propanamine

c) N-Methyl ethanamine

d) N-Ethyl ,N-methylethanamine

8. ligands like NO_2^- and SCN^- are called

a) unidentate

b) didentate

c) polydentate

d) Ambidentate

OR

The formula of the coordination compound Potassium tetrahydroxozincate(II) is

a) K2[Zn(OH)4]

b) K3[Zn(OH)4]

c) K4[Zn(OH)4]

d) K2[Zn(OH)2]

9.Which set of ions exhibit specific colours? (Atomic number of Sc = 21, Ti = 22, V=23, Mn = 25, Fe = 26, Ni = 28 Cu = 29 and Zn =30)

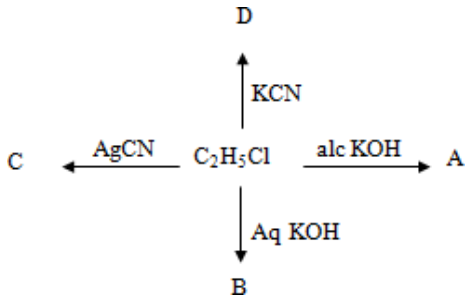
a) Sc^{3+}, Ti^{4+}, Mn^{3+}

b) Sc^{3+}, Zn^{2+}, Ni^{2+}

c) V^{3+}, V^{2+}, Fe^{3+}

d) Ti^{3+}, Ti^{4+}, Ni^{2+}

10. Identify A,B,C and D:



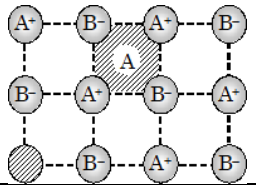
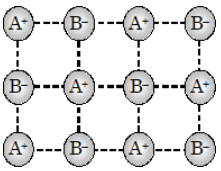
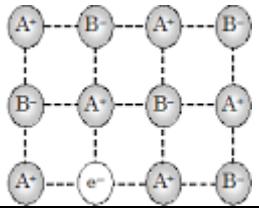
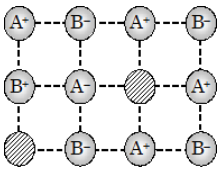
a) A = C2H4, B= C2H5OH, C= C2H5NC, D= C2H5CN

b) A= C2H5OH, B= C2H4, C = C2H5CN, D=C2H5NC

c) A = C2H4, B= C2H5OH, C= C2H5CN, D= C2H5NC

d) A= C2H5OH, B= C2H4, C= C2H5NC, D= C2H5CN

11. The crystal showing Frenkel defect is :

A		B	
C		D	

In the following questions (Q. No. 12 - 16) a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
b) Assertion and reason both are correct statements but 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.

12. Assertion: The two strands are complementary to each other
Reason: The hydrogen bonds are formed between specific pairs of bases.

13. Assertion: Ozone is thermodynamically stable with respect to oxygen.
Reason: Decomposition of ozone into oxygen results in the liberation of heat

14. Assertion: Aquatic species are more comfortable in cold waters rather than in warm waters.
Reason: Different gases have different K_H values at the same temperature

OR

Assertion: Nitric acid and water form maximum boiling azeo trope.

Reason: Azeotropes are binary mixtureshaving the same composition in liquid and vapour phase

15. Assertion: Carboxylic acids are more acidic than phenols.
Reason: Phenols are ortho and para directing.

16. Assertion: Methoxy ethane reacts with HI to give ethanol and iodomethane

Reason: Reaction of ether with HI follows S_N2 mechanism

SECTION B

The following questions, Q.No 17 – 25 are short answer type and carry 2 marks each.

17. (i)Which having fast SN2 reaction CH3CH2CH2CH2Br or CH3CH2CHBrCH3

    (ii)write decreasing order of reactivity of SN1 in P ,S , T

OR

Carry out the following conversions in not more than 2 steps:

(i)Aniline to chlorobenzene

(ii)2-bromopropane to 1- bromopropane

18. 18 gm of glucose $C_6H_{12}O_6$ is dissolved in 1 Kg of water in a saucepan. At what temperature will water boil at 1.013 bar ?A glucose solution which boils at 101.04°C at 1 atm. (Given: K_b for water is 0.52 K kg mol^{-1})

19. (i)Write the electronic configuration iron ion in the following complex ion and predict its magnetic behavior :

    $K_4[Fe(CN)_6]$

    (ii)Write the IUPAC name of the coordination complex: $[Co(NH_3)_6]Cl_3$

OR

(i) Predict the geometry of $[NiCN_4]^{2-}$

(ii) Calculate the spin only magnetic moment of $[Cu(NH_3)_4]^{2+}$ ion.

20. For a reaction the rate law expression is represented as follows:

    Rate = k $[A][B]^2$

    i. What is the order of reaction.

    ii. Write the units of rate constant for this reaction if concentration of A and B is expressed in moles/L.

OR

The following results have been obtained during the kinetic studies of the reaction:

$P + 2Q \rightarrow R + 2S$

Exp.	**Initial P(mol/L)**	**Initial Q (mol/L)**	**Init. Rate of Formation of R (M min^{-1})**
1	0.10	0.10	3.0×10^{-4}
2	0.30	0.30	9.0×10^{-4}
3	0.10	0.30	3.0×10^{-4}
4	0.20	0.40	6.0×10^{-4}

Determine the rate law expression for the reaction.

21. For the first order reaction show that time required for 99% completion is twice the time required for the completion of 90% of reaction.

22. Give a mechanism for the reaction dehydration of alcohol to form ether

23. Give the formula and describe the structure of a noble gas species which is isostructural with ICl_4.

24. What happen when Propyl alcohol react with (a)$SOCl_2$ (b)PCl_5

25. Atoms of element B form *hcp* lattice and those of the element A occupy 1/3rd of tetrahedral voids. What is the formula of the compound formed by the element A and B ?

SECTION C

Q.No 26 -30 are Short Answer Type II carrying 3 mark each.

26. Give reasons for the following:

i. Transition elements act as catalysts

ii. It is difficult to obtain oxidation state greater than two for Copper.

iii. CrO is basic but Cr_2O_3 is amphoteric.

OR

i. Why are halogens coloured ?

ii. Why is ICl more reactive than I2 ?

iii. Which form of sulphur shows paramagnetic behaviour ?

27. Arrange the following in increasing order of property specified:

i. C6H5NH2 , (C2H5)2NH , C2H5NH2 (solubility in water)

ii. C2H5OH , (CH3)2NH , C2H5NH2 (boiling point)

iii. C2H5NH2 , (C2H5)2NH , (C2H5)3N , NH3 (basic strength in gas phase)

OR

i. C6H5NH2 and CH3NH2 (Differenciate)

ii. Write Carbylamines reaction

iii. Out of butan-1-ol and butan-1-amine, which will be more soluble in water and why?

28. Silver form ccp lattice and X-ray studies of its crystals show that the edge length of its unit cell is 408.6 pm . calculate the density of silver (Atomic mass of silver is 107.9 u)

29. (i) Write the reaction happen aldehyde having no alfa hydrogen undergoes oxidation and reduction

(ii)Write the reaction of Aldol condensation

(iii)write the reaction show Decarboxylation

30. i. Arrange the following in decreasing order of bond dissociation enthalpy

F_2 , Cl_2 , Br_2 , I_2

ii. Why is helium used in diving apparatus

iii. Noble gases have very low boiling points. Justify

SECTION D

Q.No 31 to 33 are long answer type carrying 5 marks each.

31. (i) Answer the following questions: **(2+3)**

a) Write the balanced chemical reaction of $FeSO_4$ with $KMnO_4$.

b) Draw the shape of BrF_3

(i) Write all chemical reaction for preparation of $K_2Cr_2O_7$ by Chromite ore

OR

(i) Answer the following questions: **(2+3)**

a) Arrange the following in the increasing order of acid strength:

HF, HCl, HBr, HI

b) Give the formula of the brown ring formed at the interface during the ring test for nitrate.

(ii) Complete the following reaction

$P_4 + 3NaOH + 3H_2O \rightarrow$

$4HCl + O_2 \rightarrow$

$XeF_6 + 3H_2O \rightarrow$

32. An organic compound with molecular formula $C_8H_{16}O_2$ was hydrolysed with dilute sulphuric acid to give carboxylic acid B and an alcohol C , oxidation od C with cromic acid produced B and C on dehydration give but – 1- ene what are A, B and C.

Write Williamsons synthesis and Clemensons reduction **(5)**

OR

(i) Write the reaction for idoform test and Stephen reaction .

(ii) How will you carry out the following conversions:

a) Phenol to benzene
b) Propanone to propene
c) Benzene to *toulene*

33. (i) State Kohlrausch law with one example **(2+3)**

(ii) Calculate the emf of the following cell at 298 K:

$2Al + 3Cu^{3+}(0.01M) \rightarrow 2Ai^{3+}(0.01M) + 3Cu$

(Given Ecell = 1.98 V)

OR

(i) On the basis of E^o values identify which amongst the following is the strongest oxidising agent **5**

$Cl_2(g) + 2\ e^- \rightarrow 2Cl^-$ $E^o = +1.36$ V,

$MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$ $E^o = +1.51$ V

$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$ $E^o = +1.33$ V

(ii) Explain how the molar conductivity varies on dilution in weak electrolyte and strong electrolyte

(iii) What is limiting molar conductivity

(iv) Write the reaction of electrolysis of conc sulphuric acid