GREEN VALLEY INTERNATIONAL PUBLIC SCHOOL
CLASS XII
CHEMISTRY(043)   MM 70

Time: 3 Hrs

General instructions:

I) All questions are compulsory

II) The question has five sections A,B,C, DAND E

III) Section A contains 16 questions 1 mark each

IV) Section B contains 5 short answer questions 2 marks each

V) Section C contains 7 short answer questions 3 marks each

VI) Section D contains 2 case study

VII) Section E contains 3 long question 5 marks each

VIII) use log tables and calculators is not allowed

SECTION A

Choose the correct option

1.The molal depression constant depends on
 a) Nature of solvent
 b) Nature of solute
 c) Vapour pressure of solution
 d) Number of particles formed in the solution

2.To a Daniel cell, if an external voltage of 1.1V is applied
a) Electrons flow from zinc to copper and current flows from copper to zinc
b) Electrons flow from copper to zinc and current flows from zinc to copper
c) No flow of electrons or current
d) Zinc dissolves at anode and copper deposits at cathode

3.Which of the following metals is obtained by leaching the ore with dilute cyanide solution?
a) Silver b) Titanium c) Nickel d) Aluminium

4. In an electrochemical cell
a) Potential energy is converted to chemical energy
b) Chemical energy is converted to potential energy
c) Chemical energy is converted into electric energy
d) Electrical energy is used to carry out a chemical reaction in the cell.

5. Which of the following solutions behave ideally?

a) Benzene and toluene b) Ethanol and acetone c) Carbon disulphide and acetone d) Phenol and aniline

6. How many possible monochloro structural isomers are expected to be formed on free radical monochlorination of $(CH_3)_2CHCH_2CH_3$?

a)5   b)4   c) 3   d)6

7. What is the number of all individual items present in 4-tert.Butyl-3-iodoheptane?

a)11 carbon, 25 hydrogen and 1 iodine atoms

b)11 carbon, 23 hydrogen and 1 iodine atoms

c) 10 carbon, 23 hydrogen and 1 iodine atoms

d)11 carbon, 23 hydrogen and 2 iodine atoms

8 . What is the number of all individual items present in 2-Chloro-3-methylpentane?

a) 6 carbon, 13 hydrogen and 1 chlorine atoms
b) 6 carbon, 15 hydrogen and 1 chlorine atoms
c) 6 carbon, 13 hydrogen and 2 chlorine atom

d) 7 carbon, 13 hydrogen and 1 chlorine atoms

9. How many structural isomers are present corresponding to the molecular formula,C5H11Br?
a)   4   b)   8   c) 6   d)   10

10. How many different dihalogen derivatives of propane can be formed?
a)   4   b) 3   c)5   d)6

11. Choose the correct statement with respect to the vapour pressure of a liquid among the following
a)Increases linearly with increasing temperature.

b) Decreases linearly with increasing temperature.
c)Decreases non-linearly with increasing temperature.
d)Increases non-linearly with increasing temperature.

12. Raoult's law is obeyed by each constituent of a binary liquid solution when :

a)the forces of attractions between like molecules are greater than those between unlike molecules
b) the forces of attractions between like molecules are smaller than those between unlike molecules
c)the forces of attractions between like molecules are identical with those between unlike molecules
d) the volume occupied by unlike molecules are different

13. For a first order reaction, the time required for completion of 90% reaction is 'x' times the half life of the reaction. The value of 'x' is (Given ln10=2.303 and log2=0.3010)
a)1.12   b) 2.43   c)3.32   d) 33.31

14. sotope(s) of hydrogen which emits low energy β– particles with t½ value >12 years is/are
a) Protium b) Tritium   c) Deuterium   d)   Deuterium and Tritium

15. Iron carbonyl, Fe(CO)5 is

a) 2 Mononuclear

b) 4 Trinuclear

c) 1 Tetranuclear

d) 3 Dinuclear

16. IUPAC name of ethyl isopropyl ketone is

a) 2-methylpent-2-one   b) 4-methylpent-3-one
c) 2-methylpent-3-one   d) 4-methylpent-2-one

SECTION B

17 How much electricity is required in coulomb for the oxidation of
   (I)   1 mole of H_2O to O_2
   (II)   1 mole of FeO to Fe_2O_3
18.   State the role of activated complex in a reaction and state in the relation with activation energy.
19. The rate of the chemical reaction doubles for an increase of 10K in absolute
temperature from 298K. Calculate E,. (log2=0.3010)
20 Explain the following phenomena) with the help of Henry's law

(I)Painful conditions known as bends.

OR

What is the role of HNO_3 in the nitrating mixture used for the nitration of benzene?

 21.Draw the structure of the following organic compounds :

(I) N,N Dimethylmethanamine
(II) N,N Dimethylbutan-1-amine
(III) N,N Dimethylbenzenanile

SECTION C

22. Write the IUPAC names of the following coordination compound (any three):
I) $[Co(NH_3)4cl(NO_2)]cl$ II) $[Ni(NH_3)_6cl_2$
III) $K3[Cr(c_2o_4)_3$ IV) $[Co(en)_2Br_2]+$
23. Complete the following chemical equation:
I)$Mno_4-(Aq) + s_2o_{32}-(Aq) +H2O (l)$
II) $crO_2 o_{72}-(aq)+ fe_2+(aq) H+ (aq)$
24.(I) Give the reaction for the formation of phosgene gas.
(II) What happens when phosgene gas reacts with ethanol (Give Chemical Reaction)

25. Write the IUPAC name of the following compounds.

(A) CH_3—CH—CH—CH—CH—CH_3
       | | | |
      CH_3 OH C_2H_5 OH

(B)
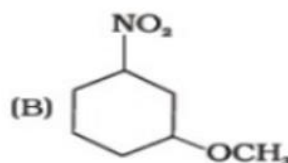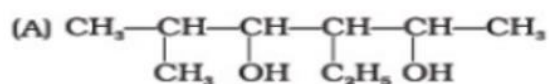
26. Write the structures of the isomers of alcohols with molecular formula $C_4H_{10}O$. Which of these exhibits optical activity?

27. Write the structures of the isomers of alcohols with molecular formula $C_4H_{10}O$. Which of these exhibits optical activity? chloride and then benzaldehyde from it.

28. Arrange the following in decreasing order of their acidic strength and give the reason for your answer.

CH_3CH_2OH, CH_3COOH, $ClCH_2COOH$, FCH_2COOH, $C_6H_5CH_2COOH$

OR

Oxidation of ketones involves carbon-carbon bond cleavage. Name the products formed on oxidation of 2, 5-dimethyl hexane-3-one.

29. Ethylbenzene is generally prepared by acetylation of benzene followed by reduction and not by direct alkylation. Think of a possible reason.

OR

Why are carboxylic acids more acidic than alcohols or phenols, although they all have hydrogen atoms attached to an oxygen atom (-0-H)?

SECTION D

Dependence of the rate of reaction on the concentration of reactants, temperature, and other factors is the most general method for weeding out unsuitable reaction mechanisms. The term mechanism means all the individual collisional or elementary processes involving molecules (atoms, radicals, and ions included) that take place simultaneously or consecutively to produce the observed overall reaction. For example, when hydrogen gas reacts with bromine, the rate of the reaction was found to be proportional to the concentration of H2 and to the square root of the concentration of Br2 . Furthermore, the rate was inhibited by increasing the concentration of HBr as the reaction proceeded. These observations are not consistent with a mechanism involving bimolecular collisions of a single molecule of each kind. The currently accepted mechanism is considerably more complicated, involving the dissociation of bromine molecules into atoms followed by reactions between atoms and molecules: It is clear from this example that the mechanism cannot be predicted from the overall stoichiometry (source: Moore, J. W., & Pearson, R. G. (1981). Kinetics and mechanism. John Wiley & Sons.)

a. Predict the expression for the rate of reaction and order for the following: H2 + Br2 ⮕ 2 HBr What are the units of rate constant for the above reaction?

b. How will the rate of reaction be affected if the concentration of Br2 is tripled?

<div align="center">OR</div>

What change in the concentration of H2 will triple the rate of reaction?

c. Suppose a reaction between A and B, was experimentally found to be first order with respect to both A and B. So the rate equation is: Rate = k[A][B]

Which of these two mechanisms is consistent with this experimental finding? Why?

Mechanism 1 A → C + D (slow) B + C → E (fast) Mechanism 2 A + B → C + D (slow) C → E (fast)

30. Henna is investigating the melting point of different salt solutions. She makes a salt solution using 10 mL of water with a known mass of NaCl salt. She puts the salt solution into a freezer and leaves it to freeze. She takes the frozen salt solution out of the freezer and measures the temperature when the frozen salt solution melts. She repeats each experiment.

S.No	Mass of the salt used in g	Melting point in °C	
		Readings Set 1	Reading Set 2
1	0.3	-1.9	-1.9
2	0.4	-2.5	-2.6
3	0.5	-3.0	-5.5
4	0.6	-3.8	-3.8
5	0.8	-5.1	-5.0
6	1.0	-6.4	-6.3

Assuming the melting point of pure water as 0oC, answer the following questions:

a. One temperature in the second set of results does not fit the pattern. Which temperature is that? Justify your answer.

b. Why did Henna collect two sets of results?

c. In place of NaCl, if Henna had used glucose, what would have been the melting point of the solution with 0.6 g glucose in it?

OR

What is the predicted melting point if 1.2 g of salt is added to 10 mL of water? Justify your answer

SECTION E

31. a. A purple colour compound A, which is a strong oxidising agent and used for bleaching of wool, cotton, silk and other textile fibres was added to each of the three test tubes along with H2SO4 . It was followed by strong heating.
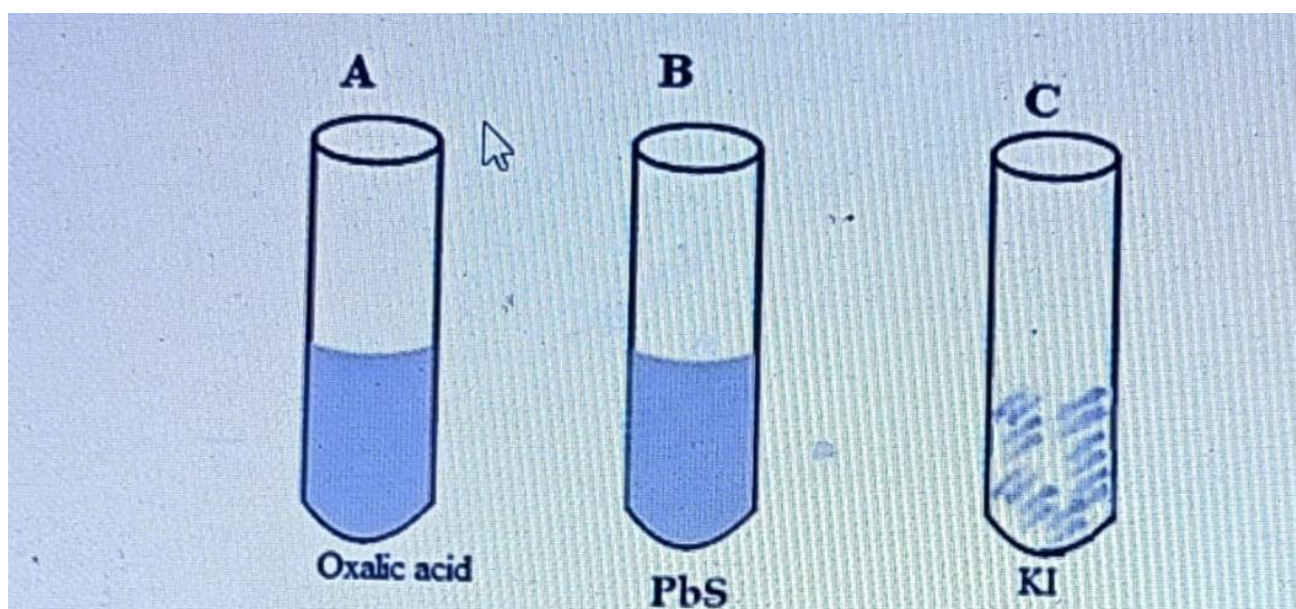
In which of the above test tubes; A,B or C:

(i)   Violet vapours will be formed

(ii)   (ii) The bubbles of gas evolved will extinguish a burning matchstick. Write an equation for each of the above observations.

 b. A metal ion Mn+ of the first transition series having d 5 configuration combines with three didentate ligands. Assuming $\Delta0 < P$:

(i) Draw the crystal field energy level diagram for the 3d orbital of this complex.

(ii) What is the hybridisation of Mn+ in this complex and why?

(iii)   Name the type of isomerism exhibited by this complex.

OR

(I)State Faraday's laws of electrolysis.

(II) Calculate the EMF of the cell in which the following reaction takes place

Ni(s) + 2Ag(0.002M' Ni(0.160M) + 2Ag(s)
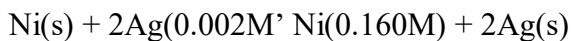
Given that Ebeli 1.05V, log4 = (0.6021)

32. What is the coordination entity formed when excess of aqueous KCN is added to an aqueous solution of copper sulphate? Why is it that no precipitate of copper sulphide is obtained when H2S(g) is passed through this solution?

OR

Draw the Shapes of different coordination polyhedra.

33. From the rate expression for the following reactions, determine their order of reaction and the dimensions of the rate constants.
A: $3NO(g) \rightarrow N2O(g) Rate = k[NO]2$
B: $H2O2(aq) + 3I - (aq) + 2H + \rightarrow 2H2O(I) + I3 - Rate = k[H2O2][I-]$
C: $CH3CHO(g) \rightarrow CH4(g) + CO(g) Rate = k[CH3CHO]3/2$
D: $C2H5Cl(g) \rightarrow C2H4(g) + HCl(g) Rate = k[C2H5Cl]$