

**KENDRIYA VIDYALAYA SANGTHAN BHOPAL REGION**  
**PRE BOARD EXAMINATION 2020-21**  
**CLASS XII**  
**Subject: CHEMISTRY (043)**  
**SET C**

**MM:70**

**Time: 3 Hours**

**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 4 marks each, carrying MCQ type question of 1 or 2 marks each.
- 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 calculator is not permitted.

**SECTION –A : Q. No. 1 to 2 are case-based questions 4 marks each, carrying MCQ type question of 1 or 2 marks each.**

**Q.(1)** Colloids can also be referred as disperse systems. The term "Disperse System" refers to a system in which one substance, the dispersed phase is distributed, in discrete units, throughout a second substance which is the continuous phase. Each phase can exist in solid, liquid or gaseous phase. Their particle size is in between true solution and suspension. Colloids find many applications in everyday life. Various examples are gemstones, milk, jellies, ice cream, Fog, smoke etc.

The following questions are multiple choice questions. Choose the most appropriate answer: (2X2=4)

**(i)** Match the **column A** with correct option in **Column B** and choose the correct option

<b>COLUMN A</b>	<b>COLUMN B</b>
1) Paints	i) Aerosol
2) Milk	ii) Gel
3) Mist	iii) Emulsion
4) Cheese	iv) Sol

- (a) 1-(iv), 2-(iii), 3-(i), 4(ii)
- (b) 1-(iii), 2-(iv), 3-(i), 4(ii)
- (c) 1-(iv), 2-(ii), 3-(iii), 4(i)
- (d) 1-(iii), 2-(ii), 3-(iv), 4(i)

**(ii)** State whether the following statements are **True or false** and choose the correct option

1. Bredig's arc method is electro-disintegration method for Purification of colloids
2. The flocculation value of  $\text{Na}_2\text{SO}_4$ ,  $\text{MgSO}_4$  and  $\text{Al}_2(\text{SO}_4)_3$  for a given colloid will be in the order  $\text{Al}_2(\text{SO}_4)_3 > \text{MgSO}_4 > \text{Na}_2\text{SO}_4$
3. Protective colloids are usually lyophobic colloid
4. The movement of colloidal particles under an applied electric potential is called Electrophoresis.

- (a) 1- TRUE, 2-TRUE, 3-TRUE 4-FALSE
- (b) 1- FALSE, 2-FALSE, 3-FALSE 4-TRUE
- (c) 1-TRUE, 2- TRUE, 3-FALSE 4-FALSE
- (d) 1-FALSE, 2-TRUE, 3- FALSE 4-TRUE

**Q.(2)** The polarity of the carbon-halogen bond is responsible for the nucleophilic substitution reactions of alkyl halides which most occur by  $S_N1$  and  $S_N2$  mechanisms. The rates of  $S_N2$  reactions among other things are governed by steric factors while that of  $S_N1$  reactions are governed by stability of intermediate carbonations. Chirality has profound role in understanding the mechanism of  $S_N1$  and  $S_N2$  reactions. In  $S_N2$  reactions of chiral alkyl halides are accompanied by bimolecular nucleophilic displacement reaction and go through transition state where carbon atom is simultaneously bonded to incoming nucleophile and out going leaving group.  $S_N1$  reactions are characterized by both retention and inversion of configuration.

The following questions are multiple choice questions. Choose the most appropriate answer: (1X4=4)

- (i)  $S_N1$  reaction of optically active alkyl halides leads to
- Retention of configuration
  - Racemization
  - Inversion of configuration
  - None of the above.
- (ii) An  $S_N2$  reaction at an asymmetric carbon of a compound always gives
- Racemization
  - Inversion of configuration
  - Retention of configuration
  - None of above
- (iii) In the solvolysis of 3-methyl-3-bromohexane, which of the following statement is not correct?
- It involves carbocation intermediate
  - The intermediate involves  $sp^2$  carbon
  - Polar solvents accelerate the reaction depends upon 3-methyl-3-bromohexane concentration
  - It involves inversion of configuration.
- (iv).The correct increasing order of reactivity towards  $S_N2$  for given compounds is-
- 1-Bromobutane < 1-Bromo-2,2-dimethyl propane < 1-Bromo-2-methyl butane < 1-Bromo-3-methylbutane.
  - 1-Bromo-2,2-dimethyl propane < 1-Bromo-2-methyl butane < 1-Bromo-3-methylbutane < 1-Bromobutane.
  - 1-Bromobutane < 1-Bromo-3-methylbutane < 1-Bromo-2-methyl butane < 1-Bromo-2,2-dimethyl propane.
  - 1-Bromo-2,2-dimethyl propane < 1-Bromo-3-methylbutane < 1-Bromo-2-methyl butane < 1-Bromobutane.

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

**Q.(3)** A compound forms hcp structure. What is total no of voids in 1 mole of it .

- $3 \times 6.023 \times 10^{23}$
- $6.023 \times 10^{23}$
- $2 \times 6.023 \times 10^{23}$
- $4 \times 6.023 \times 10^{23}$

**Q.(4)** When silver nitrate solution is added to KI solution in excess , negative sol is prepared. This is due to

- accumulation of  $I^-$  ions in the solution
- excess of  $I^-$  ions in the solution
- adsorption of  $I^-$  ions by AgI
- adsorption of  $I^-$  ions by  $Ag^+$

**OR**

**Q.(4)** The formation of micelles takes place only above a particular concentration called CMC.

This occurs in case of

- Macro molecular colloid
- Micro molecular colloid
- Associated colloid
- All the colloids

**Q.(5)** Which of the following has least bond angle –

- $NH_3$
- $SbH_3$
- $AsH_3$
- $BiH_3$



- Q.(12) **ASSERTION** : Liquid Y has higher Vapour pressure than Liquid Z hence Z will have higher Boiling point than Y.  
**REASON**: Boiling point increases when a non volatile solute is added to a solvent
- Q.(13) **ASSERTION** :Half life is independent of initial concentration in case of I st Order reaction  
**REASON** : The half life is the time period in which half amount of the product is formed of the total yield
- Q.(14) **ASSERTION** -: Mercury is not considered as transition element.  
**REASON** : Mercury is liquid at room temperature .
- Q.(15) **ASSERTION**: The  $\alpha$ -hydrogen atom in carbonyl compounds is acidic.  
**REASON**: The anion formed after the loss of  $\alpha$ -hydrogen atom is resonance stabilised
- Q.(16) **ASSERTION**: N-Ethyl benzene sulphonamide is soluble in alkali.  
**REASON**: Hydrogen attached to nitrogen in sulphonamide is strongly acidic

**SECTION –B:** Q. No. 17 to 25 are short answer questions and carry 2 marks each.

- Q.(17) State Henry's law ? The value of Henry's constant( $K_H$ ) for  $H_2$  and He is 69.16 kbar and 144.97 kbar respectively at 293 K temperature. Which of these two gases has more solubility at 293K. Why?

**OR**

- a) What happens when pressure greater than osmotic pressure is applied on the solution side separated from solvent by a semi-permeable membrane?  
 b) Which type of deviation is observed when acetone is added to pure ethanol?

- Q.(18) A reaction is first order in A and second order in B for reaction  $A+B \rightarrow \text{Product}$ .

- a) How is rate affected on increasing the concentration of B three times?  
 b) How is rate affected when the concentration of both A and B are doubled?

**OR**

The C-14 content of an ancient piece of wood was found to have three tenths of that in living trees. How old is that piece of wood? ( $\log 3 = 0.4771$ ,  $\log 7 = 0.8540$ , Half-life of C-14 = 5730 years )

- Q.(19) Which Compound is the basis for the formation of first compound of xenon,  $Xe^+[PtF_6]^-$  prepared by N.Bartlett .What similarities he observed in these two compounds?

**OR**

Arrange the following in the order of property indicated for each set:

- a)  $F_2, Cl_2, Br_2, I_2$  ----- increasing bond dissociation enthalpy  
 b)  $HCl, HF, HI, HBr$  ----- increasing acidic strength

- Q.(20) For the first row of transition metals the  $E^0$  value are

$E^0$	V	Cr	Mn	Fe	Co	Ni	Cu
( $M^{2+}/M$ )	-1.18	-0.91	-1.18	-0.44	-0.28	-0.25	+0.34

Give reason for

- a) Why the general trend is towards less negative  $E^0$  values across the series ?  
 b) Why Copper has high  $E^0$  value?

- Q.(21) Write answer

- a) On the basis of crystal field theory , write the electronic configuration for  $d^4$  ions if  $\Delta_0 < p$   
 b) Write IUPAC name of complex  $[Cr(NH_3)_4Cl_2] Cl$

**OR**

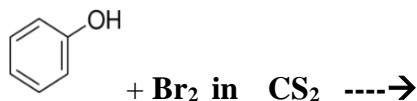
- a)  $[NiCl_4]^{2-}$  is paramagnetic while  $[Ni(CN)_4]^{2-}$  is diamagnetic , why ?  
 b) Write the state of Hybridisation of Ni and shape of a complex  $[Ni(NH_3)_6]^{2+}$ .

- Q.(22) Write the following reaction a) Rosenmunds Reduction  
b) Hell Volhard Zelinsky reaction

Q.(23) Predict the product of the following



(b)



Q.(24) How will you distinguish between the following compound through a chemical test .

- a) Propan-2-ol and 2-methylpropan-2-ol.  
b) Phenol and benzoic acid

Q.(25) (a) Predict the magnetic behaviour of  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$

(b) Write the formula of coordination compound-Potassium hexanitrito-O-cobaltate(III)

**SECTION –C: Q. No. 26 to 30 are short answer questions and carry 3 marks each.**

Q.(26) Aluminium crystallizes in a cubic close-packed structure. Its metallic radius is 125 pm.

- (a) What is the length of the side of the unit cell?  
(b) How many unit cells are there in  $1.00 \text{ cm}^3$  of aluminium?

Q.(27) For the reaction  $\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{C}_6\text{H}_{12}\text{O}_6$

Write (a) Rate of reaction expression (b) Rate law equation (c) order of reaction and its unit.

Q.(28) Give reason

- (a) A transition metal exhibits higher oxidation state in oxides and fluorides only.  
(b) Of the  $d^4$  configuration,  $\text{Cr}^{2+}$  is reducing while  $\text{Mn}^{3+}$  is oxidising .  
(c) The salt of  $\text{Sc}^{3+}$  are always colourless.

**OR**

- a] Which is a stronger reducing agent  $\text{Cr}^{2+}$  or  $\text{Fe}^{2+}$ . Why?  
b] Give the general electronic configuration of inner transition elements  
c] Why there is no increase in size of elements from 4d to 5d series

Q.(29) (a) Convert (i) Ethanal to But-2-enal (ii) Ethanenitrile to ethanal

(b) Write the structure of given compound named : 4-Methylpent-3-en-2-one

**OR**

- a] Why Acetic acid is more stronger acid than phenol?  
b] Arrange the following compounds in increasing order of their reactivity towards HCN:  
Acetaldehyde, Acetone, Di-tert-butyl ketone.  
c] Arrange the following compounds in increasing order of acid strength:  
Benzoic acid, 4-Nitrobenzoic acid, 4-Methoxybenzoic acid.

Q.(30) Complete the reaction and write their name

- a] when Ethanamide is treated with  $\text{Br}_2$  and  $\text{KOH}(\text{aq})$   
b] when methyl amine is treated with  $\text{CHCl}_3$  and  $\text{KOH}(\text{alc.})$   
c] when Diazonium salt is reacted with  $\text{Cu}_2\text{Cl}_2/\text{HCl}$

**OR**

**Arrange the following :**

- a]  $C_2H_5NH_2$ ,  $(C_2H_5)_2NH$ ,  $(C_2H_5)_3N$ ,  $NH_3$  -- In decreasing order of their basic character in aqueous solution.
- b]  $C_2H_5NH_2$ ,  $(C_2H_5)_2NH$ ,  $C_6H_5NH_2$  ----- In increasing order of solubility in water
- c]  $C_2H_5OH$ ,  $C_2H_5NH_2$ ,  $(C_2H_5)_2NH$  ----- In increasing order of boiling points

<b>SECTION –D:</b> Q. No. 31 to 33 are long answer questions carrying 5 marks each.
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- Q.(31)** a) Solutions of two electrolytes ‘A’ and ‘B’ are diluted equally . The  $\Lambda_m$  of ‘B’ increases 1.5 times While that of A increases 25 times. Which of the two is a strong electrolyte? Justify your answer
- b) Calculate the potential of Hydrogen electrode in contact with a solution whose pH is 10 at 298K.

**OR**

- a) Calculate  $\Lambda_m^0$  for  $CaCl_2$  if  $\lambda_{Ca^{2+}}^0 = 119.0 \text{ S cm}^2 \text{ mol}^{-1}$   $\lambda_{Cl^-}^0 = 76.3 \text{ S cm}^2 \text{ mol}^{-1}$
- b) Calculate  $\Delta G^\circ$  and  $\log K_c$  for the following reaction at 298 K
- $$2Cr(s) + 3 Fe^{+2} \rightarrow 2Cr^{+3} + 3 Fe (s)$$
- [Given that  $E^\circ_{cell} = 0.30 \text{ V}$  ,  $F = 96500 \text{ C/mol}$  ,  $R = 8.314 \text{ J/K/mol}$ ]

- Q.(32)** a) Give reason
- (i) Why ICl is more reactive than  $I_2$
- (ii) Why  $H_2O$  is liquid while  $H_2S$  is gas at room temperature
- b) (i) Draw the structure of  $BrF_5$  and  $H_2SO_3$
- (ii) what action is performed by  $H_2SO_4$  in charring of carbohydrates when both react.

**OR**

- a) Complete following reactions
- (i)  $H_2SO_4 + Cu \rightarrow$
- (ii)  $XeF_4 + H_2O \rightarrow$
- b) Account for the following :
- (i) Ozone is thermodynamically unstable.
- (ii) Fluorine forms only one oxoacid .
- (iii) Helium is used in diving apparatus.

- Q.(33)** (a) Define following with one example
- (i) Zwitter ion (ii) Peptide bond
- (b) What happens when D-Glucose reacts with
- (i) HI (ii)  $Br_2$  (iii)  $HNO_3$

**OR**

- (a) Write one each structural and functional difference between DNA and RNA.
- (b) (i) Give one reaction of Glucose which can not be explained by linear structure of Glucose.
- (ii) Draw cyclic structure of both anomers of Glucose.
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