

# SAMPLE PAPER 4

## CHEMISTRY

A Highly Simulated Practice Questions Paper  
for CBSE **Class XII** (Term I) Examination

### Instructions

- (i) This question paper contains three sections.
- (ii) Section A has 25 questions. Attempt any 20 questions.
- (iii) Section B has 24 questions. Attempt any 20 questions.
- (iv) Section C has 6 questions. Attempt any 5 questions.
- (v) Each questions carry 0.77 mark.
- (vi) There is NO negative marking.

Roll No.

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Maximum Marks : 35  
Time allowed : 90 min

### Section A

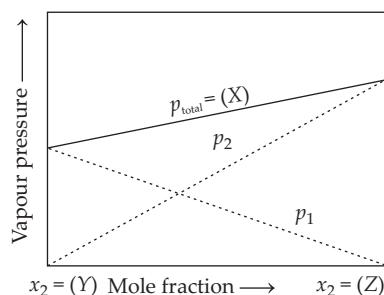
This section consists of 25 multiple choice questions with overall choice to attempt **any 20** questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

1. Which of the following compound exerts the lowest vapour pressure?  
(a) Water (b) Alcohol  
(c) Mercury (d) Ether
2. Among the following the incorrect statement regarding nitrogen is  
(a) *d*-orbitals are available for bonding (b) it is a typical non-metal  
(c) it does not readily react with O<sub>2</sub> (d) it has a small size
3. Which of the following product formed when 2-methylbutanol dehydrated with conc. H<sub>2</sub>SO<sub>4</sub> ?  
(a) 2-methylpent-2-en (b) Pentene  
(c) 2-methylbut-2-ene as major product (d) 2-methyl butene as major product
4. Which of the following inert gas participate in chemical reaction?  
(a) Xe (b) He (c) Ne (d) None of these
5. Consider the following reaction,  $C_2H_5Cl + AgF \longrightarrow C_2H_5F + AgCl$   
The name of above given reaction is  
(a) Hunsdiecker reaction (b) Swarts reaction  
(c) Strecker reaction (d) Wurtz reaction



6. The correct formula of laughing gas is .....  
 (a)  $\text{N}_2\text{O}$  (b)  $\text{NO}$  (c)  $\text{NO}_2$  (d)  $\text{N}_2\text{O}_5$

7. Consider the following graph,



X, Y and Z respectively are

- (a)  $X = p_1 + p_2, Y = 1, Z = 0$  (b)  $X = p_1 + p_2, Y = 0, Z = 0$   
 (c)  $X = p_1 + p_2, Y = 0, Z = 1$  (d)  $X = p_1 - p_2, Y = 1, Z = 1$
8. Which of the following is not the characteristic of interhalogen compounds?  
 (a) They are less reactive than halogens  
 (b) They are covalent in nature  
 (c) They are quite unstable but none of them explosive  
 (d) They are not highly volatile
9. The order of reactivity of hydrogen halides with ether is as follows :  
 (a)  $\text{HBr} > \text{HI} > \text{HCl}$  (b)  $\text{HCl} > \text{HBr} > \text{HI}$   
 (c)  $\text{HI} > \text{HBr} > \text{HCl}$  (d)  $\text{HCl} < \text{HI} > \text{HBr}$
10. Which of the following is the most stable allotropic form of sulphur?  
 (a) Rhombic (b) Monoclinic  
 (c) Plastic (d) Milk of sulphur
11. Which of the following halide is  $2^\circ$ ?  
 (a) *n*-butyl chloride (b) *Iso*-propyl chloride  
 (c) *Iso*-butyl chloride (d) *n*-propyl chloride
12. Ozone acts as .....  
 (a) oxidising agent (b) reducing agent  
 (c) bleaching agent (d) All of these
13. Which of the following compound has highest bond strength ?  
 (a)  $\text{HBr}$  (b)  $\text{HCl}$   
 (c)  $\text{HF}$  (d)  $\text{HI}$
14. Which of the following interhalogen compound exists in dimeric form ?  
 (a)  $\text{IF}_7$  (b)  $\text{BrF}_5$   
 (c)  $\text{BrCl}$  (d)  $\text{ICl}_3$
15. Which of the following product is formed when ethylene chloride is treated with aqueous  $\text{KOH}$ ?  
 (a) Acetaldehyde (b) Formaldehyde  
 (c) Ethylene glycol (d) None of these

16. Which of the following pair behaves as strong and weak base hydride respectively?



- (a)  $\text{NH}_3, \text{PH}_3$  (b)  $\text{NH}_3, \text{BiH}_3$   
(c)  $\text{PH}_3, \text{BiH}_3$  (d)  $\text{BiH}_3, \text{AsH}_3$

17. Which of the following product is formed when equimolar quantities of ethanol and methanol are heated with conc.  $\text{H}_2\text{SO}_4$ ?

- (a)  $\text{CH}_3\text{OCH}_3$  (b)  $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$   
(c)  $\text{C}_2\text{H}_5\text{OCH}_3$  (d) All of these

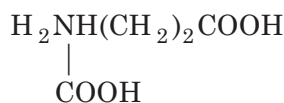
18. What type of defect occurs, when the cation leaves its normal position in the crystal and moves to some interstitial position?

- (a) F-centre (b) Schottky defect  
(c) Non-stoichiometric defect (d) Frenkel defect

19. Which of the following statements is/are incorrect for vicinal halide?

- (a) Ethylidene chloride is one of the example of it  
(b) Halogen atom is present on adjacent carbon atoms  
(c) Allylic halide is an example of this class  
(d) Both (a) and (b)

20. Consider the following amino acid :



At high pH, it exists as

- (a)  $\begin{array}{c} \text{H}_3\text{N}^+\text{CH}(\text{CH}_2)_2\text{COOH} \\ | \\ \text{COOH} \end{array}$  (b)  $\begin{array}{c} \text{H}_3\text{N}^+\text{CH}(\text{CH}_2)_2\text{COO}^- \\ | \\ \text{COO}^- \end{array}$   
(c)  $\begin{array}{c} \text{H}_2\text{N}^+\text{CH}(\text{CH}_2)_2\text{COO}^- \\ | \\ \text{COO}^- \end{array}$  (d)  $\begin{array}{c} \text{H}_2\text{NCH}(\text{CH}_2)_2\text{COO}^- \\ | \\ \text{COO}^- \end{array}$

21. Consider the following allyl halides :



- (i) (I) undergoes faster dehydration than (II) and (IV).  
(ii) (III) undergoes lower dehydrohalogenation than (I).  
(iii) (IV) has least stability to undergo dehydrohalogenation.

Choose the correct option.

- (a) Only (i) (b) (i), (ii) and (iii)  
(c) Both (ii) and (iii) (d) Only (iii)

22. Which of the following statement is not true about RNA?

- (a) It is present in the nucleus of the cell  
(b) It controls the synthesis of protein  
(c) It has always double stranded  $\alpha$ -helix structure  
(d) It usually does not replicate



23. A primary alcohol with molecular formula  $C_3H_8O$  on reaction with (X) forms  $C_3H_7Br$ . The halide formed on reaction with (Y) gives alkane ( $C_6H_{14}$ ). Identify, X and Y.
- (a) X : HBr and Y : HCN (b) X : HBr and Y : Na, ether  
(c) X :  $Br_2$  and Y :  $CH_3CN$  (d) X :  $Br_2$  and Y :  $KMnO_4$
24. Among the given compound Schottky defect is present in .....
- (a) NaCl (b)  $SiO_2$  (c) ZnS (d)  $SrCl_2$
25. Which of the following species exists ?
- (a)  $XeO_2$  (b)  $ArF_2$  (c)  $NeO_2$  (d)  $KrF_5$

## Section B

This section consists of 24 multiple choice questions with overall choice to attempt **any 20** questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

26. Identify the type of protein.
- “When the polypeptide chains run parallel are held together by hydrogen and disulphide bonds then fibre like structure is formed. Such proteins are generally insoluble in water.”
- (a) Fibrous protein (b) Globular protein  
(c) Primary protein (d) Tertiary protein
27. A solution containing 28 g of phosphorus in 315 g  $CS_2$  (b.p.  $46.3^\circ C$ ) boils at  $47.98^\circ C$ .  $K_b$  for  $CS_2$  is 2.34 K kg then what would be the formula of phosphorus. (Atomic mass of P = 31)
- (a)  $P_2$  (b)  $P_4$   
(c)  $P_3$  (d)  $P_6$
28. Which of the following statements is not true?
- (a) Pressure is higher under water than at the surface of a sea  
(b) Low surface pressure is responsible for the formation of bends in the body of scuba divers  
(c) Bubbles are actually the bubbles of nitrogen in the blood  
(d) Due to high pressure, solubility of atmospheric gases in the blood decreases
29. Consider the following reaction :
- $$\text{Phenol} \xrightarrow[\text{(ii) } CO_2/140^\circ C]{\text{(i) } NaOH} A \xrightarrow{H^+/H_2O} B$$
- In this reaction, the end product B is
- (a) salicylic acid (b) salicylaldehyde  
(c) phenyl acetate (d) aspirin
30. The number of lithium atoms present in a unit cell with edge length 3.5 Å and density  $0.53 \text{ g cm}^{-3}$  is (atomic mass of Li = 6.94)
- (a) 2 (b) 1 (c) 4 (d) 6
31. Boiling point of water at 750 mm of Hg is  $99.63^\circ C$ . How much sucrose is to be added to 500 g of water such that it boils at  $100^\circ C$ ? [ $K_b$  for water is  $0.52 \text{ K kg mol}^{-1}$ ]
- (a) 63.85 g (b) 121.7 g  
(c) 107.34 g (d) 86.9 g



32. Identify the incorrect statement related to  $\text{PCl}_5$  from the following.
- Two axial P—Cl bonds make an angle of  $180^\circ$  with each other
  - Axial P—Cl bonds are longer than equatorial P—Cl bonds.
  - $\text{PCl}_5$  molecule is non-reactive
  - Three equatorial P—Cl bonds make an angle of  $120^\circ$  with each other

33. Which of the following statements are true?

I. In a binary mixture, mole fraction of  $A$  is  $\chi_A = \frac{n_A}{n_A + n_B}$ .

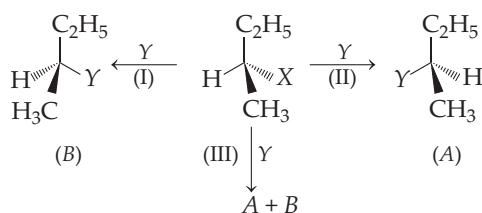
II. For solution containing (i) number of components  $\chi_i = \frac{n_i}{\sum n_i}$ .

III. Sum of mole fraction of all the components of a solution is one.

Select the correct option with true statements.

- Both I and II
- Both II and III
- Both III and I
- I, II and III

34. Consider the following reactions :



Name the terms that occur in I, II, III equations choose the correct option.

- | I                              | II                         | III                        |
|--------------------------------|----------------------------|----------------------------|
| (a) Retention of configuration | Inversion of configuration | Racemisation               |
| (b) Retention of configuration | Racemisation               | Inversion of configuration |
| (c) Racemisation               | Retention of configuration | Inversion of configuration |
| (d) Racemisation               | Inversion of configuration | Retention of configuration |
35. Ionisation enthalpy, electronegativity, bond dissociation enthalpy and electrode potential are all ... (i) ... for fluorine, than from other. It shows only ... (ii) ... oxidation state. Most of its reactions are ... (iii) ...
- (i) low, +1, endothermic
  - (ii) higher, -1, exothermic
  - (iii) low, -1, exothermic
  - (iv) higher, +1, endothermic

36. Consider the following compound :

I.  $\text{CH}_2\text{Cl}_2$

II.  $\text{CHCl}_3$

III.  $\text{CCl}_4$

Arrange these compounds in increasing order of density.

- III < II < I
  - III < I < II
  - III < I = II
  - I < II < III
37. Which of the following is the correct sequence with reference by the oxidation number of iodine ?
- $\text{I}_2 > \text{ICl} > \text{HI} = \text{HIO}_2$
  - $\text{HIO}_2 < \text{ICl} < \text{I}_2 < \text{HI}$
  - $\text{I}_2 < \text{HI} < \text{ICl} = \text{HIO}_2$
  - $\text{HI} < \text{I}_2 < \text{ICl} < \text{HIO}_4$



38. The reaction of anisole with HI gives phenol rather than iodobenzene because  
 (a) the bond between O—CH<sub>3</sub> is weaker than O—C<sub>6</sub>H<sub>5</sub>  
 (b) the carbon of phenyl group is *sp*<sup>2</sup>-hybridised and has a partial double bond character  
 (c) Both (a) and (b)  
 (d) None of the above

39. Which of the following is the correct order of strength?  
 (a) SO<sub>2</sub> = ClO > P<sub>2</sub>O<sub>10</sub> (b) Cl<sub>2</sub>O<sub>7</sub> > SO<sub>2</sub> > P<sub>4</sub>O<sub>10</sub>  
 (c) P<sub>4</sub>O<sub>10</sub> > SO<sub>2</sub> > Cl<sub>2</sub>O<sub>7</sub> (d) N<sub>2</sub>O<sub>5</sub> > P<sub>4</sub>O<sub>10</sub> > SO<sub>2</sub>

40. Which of the following statements is not correct about a Zwitter ion ?  
 (a) It is neutral and does not contain any charges  
 (b) It consists of carboxyl and amino groups  
 (c) It is dipolar  
 (d) Many amino acids exists as Zwitter ions

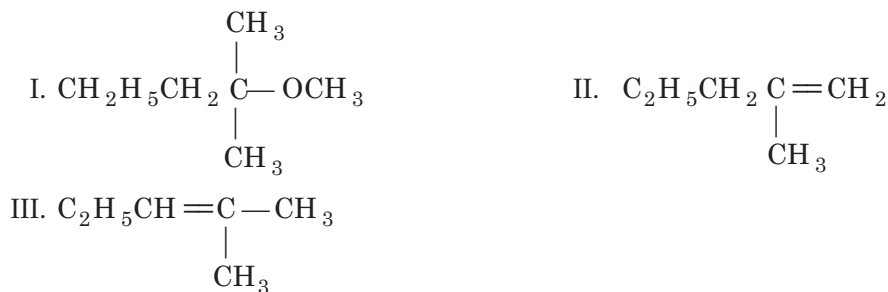
41. Consider the following alcohols :

- (i) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>OH (ii) CH<sub>3</sub>CHOH — CH<sub>3</sub>  
 (iii) CH<sub>3</sub>C(CH<sub>3</sub>)OH CH<sub>3</sub>

Which of the following result is observed when the above alcohols are treated with Lucas reagent at room temperature?

- (a) (i) reacts in about 5 minutes, (ii) reacts in about 15 minutes and (iii) not at all  
 (b) (ii) and (iii) reacts immediately and (i) in about 5 minutes  
 (c) (iii) reacts immediately (ii) reacts in about 5 minutes and (i) not at all  
 (d) (i) reacts immediately, (ii) reacts in about 5 minutes and (iii) no at all
42. Which of the following is the correct order of thermal stability for H<sub>2</sub>E (E = O, S, Se, Te and Po)?  
 (a) H<sub>2</sub>O < H<sub>2</sub>S < H<sub>2</sub>Se < H<sub>2</sub>Te < H<sub>2</sub>Po (b) H<sub>2</sub>Po < H<sub>2</sub>Te < H<sub>2</sub>Se < H<sub>2</sub>S < H<sub>2</sub>O  
 (c) H<sub>2</sub>S < H<sub>2</sub>Te < H<sub>2</sub>Po < H<sub>2</sub>O < H<sub>2</sub>S (d) H<sub>2</sub>S < H<sub>2</sub>O < H<sub>2</sub>Se < H<sub>2</sub>Te < H<sub>2</sub>Po
43. Which of the following statement is correct about fructose?  
 (a) It is dextrorotatory compound  
 (b) It exists in the two cyclic forms which is obtained by the addition of —OH at C-5 to the C=O group  
 (c) It exists as six membered ring  
 (d) It is named at furanose as it contain one oxygen and six carbon atom

44. 2-chloro-2-methylpentane on reaction with sodium methoxide in methanol yields :



- (a) Both I and III (b) Only III (c) Both I and II (d) All of these



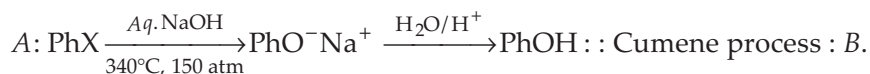
**Direction (Q. Nos. 45-49)** For given questions two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

- (a) Both A and R are true and R is the correct explanation of A.  
 (b) Both A and R are true, but R is not the correct explanation of A.  
 (c) A is true, but R is false.  
 (d) A is false, but R is true.
- 45. Assertion** A person cries more while cutting onion rather than cutting an onion which has taken out from refrigerator.  
**Reason** The cold onion has higher vapour pressure of its volatile content.
- 46. Assertion** Aryl halides cannot be prepared by replacement of hydroxyl group of phenol by halogen atom.  
**Reason** Carbon oxygen bond in phenols has a partial double bond character.
- 47. Assertion** 2-pentanol and 3-pentanol cannot be distinguished by iodoform test.  
**Reason** 2-pentanol and 3-pentanol both are secondary alcohols.
- 48. Assertion** In crystalline solids, the value of resistance is different direction.  
**Reason** Crystalline solids are anisotropic in nature.
- 49. Assertion** Solubility of noble gas in water decreases with increasing size of the noble gas.  
**Reason** Solubility of noble gas in water is due to dipole-induced interaction.

## Section C

This section consists of 6 multiple choice questions with an overall choice to attempt **any 5**. In case more than desirable number of questions are attempted, **ONLY first 5** will be considered for evaluation.

- 50.** Which of the following analogies is correct?  
 (a) Metallic solid : Hard but malleable and ductile :: Network solids : Very hard  
 (b) Orthorhombic :  $a \neq b = c; \alpha = \beta = \gamma = 90^\circ$  :: Tetragonal :  $a = b \neq c; \alpha = \beta = \gamma = 90^\circ$   
 (c) bcc : Number of atoms present in unit cell is 2 :: fcc : Number of atoms present in unit cell is 1  
 (d) hcp : Packing efficiency is 68% :: bcc : Packing efficiency is 74%
- 51.** Complete the following analogy :



- (a) A : Dow process :: B:  $\text{PhCH}(\text{CH}_3)_2 \xrightarrow[\text{H}_2\text{O}/\text{H}^+]{\text{O}_2 \text{ catalyst}} \text{PhOH} + \text{CH}_3\text{COCH}_3$
- (b) A : Williamson process :: B:  $\text{PhN}^+ \equiv \text{NX}^- \xrightarrow{\text{H}_2\text{O}/\text{H}^+} \text{PhOH} + \text{N}_2 \uparrow + \text{HX}$
- (c) A : Swarts reaction :: B:  $\text{PhCH}(\text{CH}_3)_2 \xrightarrow[\text{H}_2\text{O}/\text{H}^+]{\text{O}_2 \text{ catalyst}} \text{PhOH} + \text{CH}_3\text{COCH}_3$
- (d) A : Dow process :: B:  $\text{PhN}^+ \equiv \text{NX}^- \xrightarrow{\text{H}_2\text{O}/\text{H}^+} \text{PhOH} + \text{N}_2 \uparrow + \text{HX}$



52. Match the items given in Column I with that of given in Column II.

Column I		Column II	
A.	$\Delta H_{\text{mix}} = 0; \Delta V_{\text{mix}} = 0$	1.	Non-ideal solution
B.	$\Delta H_{\text{mix}} \neq 0; \Delta V_{\text{mix}} \neq 0$	2.	Positive deviation
C.	$\Delta H_{\text{mix}} < 0; \Delta V_{\text{mix}} < 0$	3.	Ideal solution
D.	$\Delta H_{\text{mix}} > 0; \Delta V_{\text{mix}} > 0$	4.	Negative deviation

**Codes**

	A	B	C	D
(a)	1	3	2	4
(b)	3	1	4	2
(c)	3	2	1	4
(d)	2	3	4	1

**Case** Read the passage given below and answer the following questions (53-55)

Although crystalline solids have short range as well as long, range order in the arrangement of their constituent particles, yet crystals are not perfect.

In an ideal crystal, there must be regular repeating arrangement of the constituting particles and its entropy must be zero at absolute zero temperature. However, it is impossible to obtain an ideal crystal and it suffers from certain defects called imperfections. In pure crystal, these defects arises either due to disorder or dislocation of the constituting particles from their normal positions or due to the movement of the particles even at absolute zero temperature.

Such defects increase with rise in temperature. In addition to this, certain defects arise due to the presence of some impurities. Such defects not only modify the existing properties of the crystalline solids but also impart certain new characteristics to them.

53. Which of the following does not show Frenkel defect?

- |          |         |
|----------|---------|
| (a) KCl  | (b) AgI |
| (c) AgBr | (d) ZnS |

54. In which of the following crystal, metal deficiency defect is present?

- |          |         |
|----------|---------|
| (a) ZnO  | (b) FeO |
| (c) NaCl | (d) KCl |

55. Schottky defect in a crystal is observed. When,

- no ion is missing from its lattice
- an ion leaves its normal site and occupies an interstitial site
- equal number of cation and anion are missing from the lattice
- unequal number of anion and cation are missing from the lattice





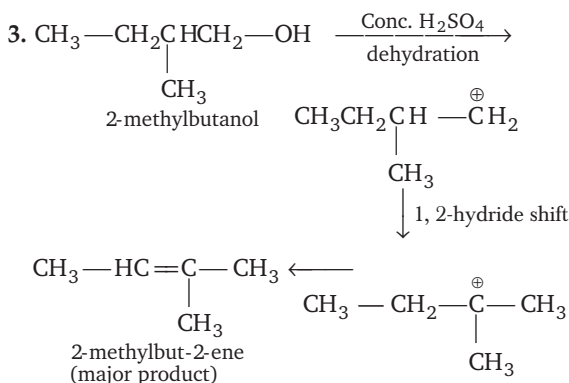
## ANSWERS

1. (c)	2. (a)	3. (c)	4. (a)	5. (b)	6. (a)	7. (c)	8. (a)	9. (c)	10. (a)
11. (b)	12. (d)	13. (c)	14. (d)	15. (a)	16. (b)	17. (d)	18. (d)	19. (a)	20. (d)
21. (d)	22. (c)	23. (b)	24. (a)	25. (a)	26. (a)	27. (b)	28. (b)	29. (a)	30. (a)
31. (b)	32. (c)	33. (d)	34. (a)	35. (b)	36. (d)	37. (d)	38. (c)	39. (b)	40. (a)
41. (c)	42. (b)	43. (b)	44. (d)	45. (c)	46. (a)	47. (d)	48. (a)	49. (a)	50. (a)
51. (a)	52. (b)	53. (a)	54. (b)	55. (d)					

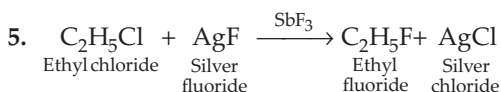
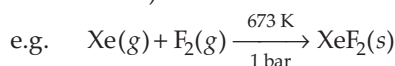
## EXPLANATIONS

1. Mercury is non-volatile, thus it exerts a lowest vapour pressure.

2. Among the given option, incorrect is (a) as, *d*-orbitals are absent in nitrogen.



4. Xe participate in the chemical reaction with most electronegative elements (like oxygen and fluorine).



This reaction is known as Swarts reaction in which alkyl (ethyl) fluoride is prepared by heating alkyl (ethyl) chloride in the presence of  $\text{SbF}_3$ ,  $\text{AgF}$  or  $\text{Hg}_2\text{F}_2$ .

6. The correct formula of laughing gas is  $\text{N}_2\text{O}$ . It produces hysterical laughter when inhaled in moderate quantities.

7. In the given graph  $X = p_1 + p_2$ ;  $Y = 0$ ;  $Z = 1$ .

8. Interhalogen compounds are more reactive than halogens because the bond formed between the two similar halogens are more stable than the bond formed between two dissimilar halogens.

9. The order of reactivity of hydrogen halides with ether is as follows :

$\text{HI} > \text{HBr} > \text{HCl}$  as on going down the group bond dissociation decreases. The cleavage of ethers take place with concentrated  $\text{HI}$  or  $\text{HBr}$  at high temperature.

10. Sulphur exists in two types of allotropes : rhombic and monoclinic structure. Among these two, the most stable allotropic form of sulphur is rhombic.

11. In *iso*-propyl chloride, i.e.  $\text{CH}_3 - \underset{\text{Cl}}{\underset{|}{\text{CH}}} - \text{CH}_3$ ,

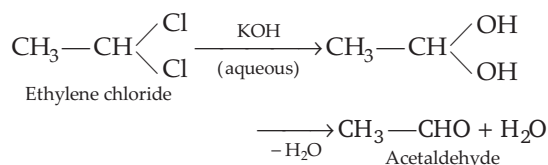
chlorine atom is attached to  $2^\circ$  carbon atom.

12. Depending upon the reaction condition, ozone can act as oxidising agent, reducing agent as well as bleaching agent.

13. The highest bond strength present in  $\text{HF}$  because of electronegativity and small size, of  $\text{F}$  holds the hydrogen atom tightly.

14.  $\text{ICl}_3$  exists in dimeric form  $\text{I}_2\text{Cl}_6$ .

15. When ethylene chloride is treated with aqueous  $\text{KOH}$ , acetaldehyde is formed.



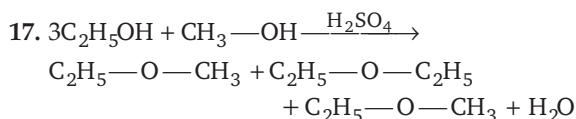
16. The basic strength of given hydrides decreases in the following order :



This is due to the decrease in the availability of the lone pair of electrons which decreases with increase in the size of central atom from  $\text{N}$  to  $\text{Bi}$ .

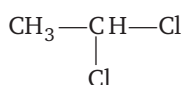
Therefore,  $\text{NH}_3$  and  $\text{BiH}_3$  acts as a strongest and weakest base hydride respectively.





Thus, all the given products are formed.

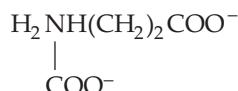
18. Frenkel defect is a type of point defect exhibited in ionic solids in which the cation leaves its normal position in the crystal and moves to some interstitial position.
19. Statement (a) is incorrect for *vicinal* halide. Its correct form is as follows :  
 The structure of ethylidene dichloride is (*gem*-halide)



In *gem*-dihalides, halogen atoms are present at the same C-atom.

Rest other statements are correct.

20. At high pH, the given amino acid exists as :



21. The correct order of dehydrohalogenation is  
 $\text{C}_2\text{H}_5\text{I} > \text{C}_2\text{H}_5\text{Br} > \text{C}_2\text{H}_5\text{Cl} > \text{C}_2\text{H}_5\text{F}$

So,  $\text{C}_2\text{H}_5\text{F}$  has least stability to undergo dehydrohalogenation.

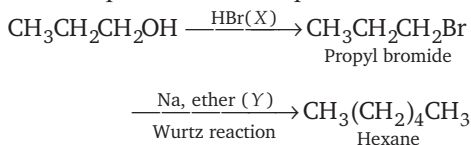
Thus, option (d) is correct.

22. RNA does not have double stranded  $\alpha$ -helix structure. Helices present in RNA are single stranded but sometimes they fold back on themselves to form a double helix structure. RNA usually does not replicate.

It is present in the nucleus of the cell. It controls the synthesis of protein, RNA molecules are of three types, i.e. messenger's RNA (*m*-RNA), ribosomal RNA (*r*-RNA) transfer RNA (*t*-RNA).

23. According to the reaction conditions given in the question, X is HBr and Y is Na, ether.

The complete reaction sequence is as follows :



24. Schottky defect is a point defect that occurs when a pair of ions leave the structure. This disorder is observed in NaCl, KCl, KBr etc.
25. Neil Bartlett prepared a red compound  $\text{O}_2^+[\text{PtF}_6]^-$  by reacting platinum hexafluoride

$[\text{PtF}_6]$  with oxygen. He found that, ionisation energy of Xe ( $1170 \text{ kJ mol}^{-1}$ ) is nearly equal to that of molecular oxygen ( $1175 \text{ kJ mol}^{-1}$ ) available. Therefore, only Xe can participate in chemical reactions and form compounds.

Hence, option (a) is correct.

26. When polypeptide chains run parallel and are held together by hydrogen and disulphide bonds, the fibre structure is formed. These are called fibrous proteins. Such proteins are generally insoluble in water.

27. Given, phosphorus = 28 g

Carbon sulphide,  $\text{CS}_2 = 315 \text{ g}$

Temperature =  $47.98^\circ\text{C}$

$K_b$  for  $\text{CS}_2 = 2.34 \text{ K kg}$

$$\Delta T_b = mK_b$$

$$= \frac{w}{M} \times \frac{1000}{W} \times K_b$$

$$\Delta T_b = 47.98 - 46.3 = 1.68$$

$$1.68 = \frac{28}{M} \times \frac{1000}{315} \times 2.38$$

$$M = \frac{28 \times 1000 \times 2.38}{315 \times 1.68} = 125.92$$

$$\text{Atomicity} = \frac{\text{Mol. wt}}{\text{Atomic wt.}} = \frac{125.92}{31} = 4.02$$

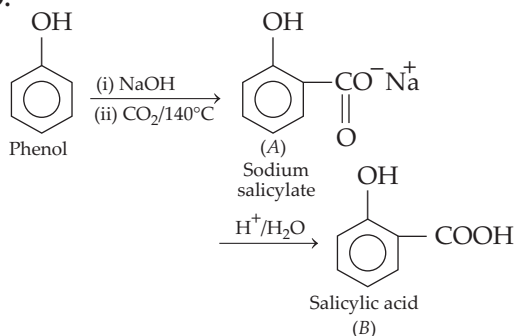
Formula of phosphorus molecule =  $\text{P}_4$

28. Statement (b) is incorrect. Its correct form is as follows :

Since, the pressure of a gas is directly proportional to the solubility. Therefore, due to high pressure, solubility of atmospheric gases in the blood increases which is responsible for the formation of bends in the body of scuba divers.

Rest other statements are correct.

- 29.



30. Given,  $a = 3.5 \text{ \AA}$   
 $d = 0.53 \text{ g cm}^{-3}$   
 $M = 6.94 \text{ g mol}^{-1}$   
 $N_A = 6.023 \times 10^{23}$



$$\text{Density of lattice } (d) = \frac{Z \cdot M}{N_A \cdot a^3}$$

$$Z = \frac{a^3 \times d \times N_A}{M}$$

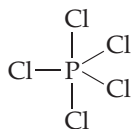
$$= \frac{(3.5 \times 10^{-8})^3 \times 0.53 \times 6.023 \times 10^{23}}{694}$$

$$= 197 \approx 2$$

31. Mass of water ( $W_A$ ) = 500 g = 0.5 kg  
 Elevation in boiling point  
 $(\Delta T_b) = 100^\circ\text{C} - 99.63^\circ\text{C} = 0.37^\circ\text{C} = 0.37\text{ K}$   
 Molal elevation constant ( $K_b$ ) = 0.52 K kg mol<sup>-1</sup>  
 Molar mass of sucrose ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ )  
 $(M_B) = (12 \times 12) + (22 \times 1) + (16 \times 11) = 342\text{ mol}^{-1}$   
 $W_B = \frac{M_B \times \Delta T_b \times W_A}{K_b}$   
 $= \frac{(342\text{ g mol}^{-1}) \times (0.37\text{ K}) \times (0.5\text{ kg})}{(0.52\text{ K kg mol}^{-1})} = 121.7\text{ g}$

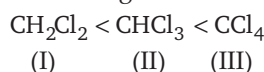
32. Statement (c) is incorrect. Its correct form is as follows :

In gaseous and liquid phases,  $\text{PCl}_5$  has a trigonal bipyramidal structure with  $sp^3d$ -hybridisation.



Due to presence of longer and weaker axial bonds  $\text{PCl}_5$  is a reactive molecule. Rest other statements are correct.

33. All the statements are correct about the mole fraction.
34. The three terms that occur in I, II and III equations are retention, inversion and racemisation respectively.  
 If (A) is the only compound obtained, the process is called retention of configuration. If (B) is the only compound obtained, the process is called inversion of configuration. If a 50:50 mixture of A and B is obtained then process is called racemisation.
35. (i)  $\rightarrow$  higher; (ii)  $\rightarrow (-1)$ ; (iii)  $\rightarrow$  exothermic
36. The density increases with increase in number of carbon atoms, halogen atoms and atomic mass of halogen atoms.  $\text{CCl}_4$  contains maximum halogen atoms followed by  $\text{CHCl}_3$  and  $\text{CH}_2\text{Cl}_2$ .  
 So, the correct increasing order of density is



37.  $\text{HI} < \text{I}_2 < \text{ICl} < \text{HIO}_4$

38. The reaction of anisole with HI gives phenol rather than iodobenzene because

- (a) the bond between O —  $\text{CH}_3$  is weaker than the bond between O —  $\text{C}_6\text{H}_5$ . Here,  
 (b) the carbon of phenyl group is  $sp^2$ -hybridised and there is a partial double bond character. Therefore, the attack by  $\text{I}^-$  ion breaks  $\text{OCH}_3$  bond to form  $\text{CH}_3\text{I}$ . Phenols do not react further to give halides because the  $sp^2$ -hybridised carbon of phenol cannot undergo nucleophilic substitution reaction needed for conversion to the halide.  
 Therefore, both (a) and (b) are correct.

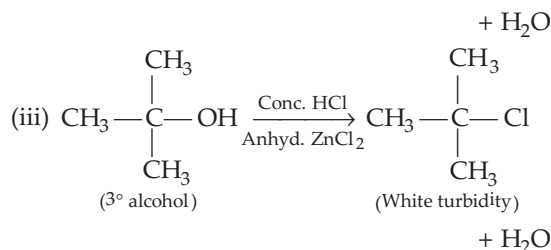
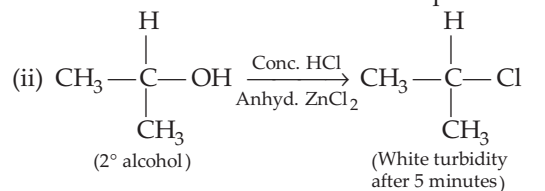
39. The correct order of acidic strength is  $\text{Cl}_2\text{O}_7 > \text{SO}_2 > \text{P}_4\text{O}_{10}$ . Because non-metallic character of element attached to oxygen atom increases, the difference between the electronegativity values of element and oxygen decreases and the acid character of oxides increases and *vice-versa*.

40. Statement (a) is incorrect. Its correct form is as follows :

It contains both positive and negative charges, but due to cancellation of charge it appears neutral.

Rest other statements are correct.

41. (i)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{—OH} \xrightarrow[\text{Anhyd. ZnCl}_2]{\text{Conc. HCl}}$  No reaction  
 (1° alcohol) at room temperature.



Tertiary (3°) alcohol gives the fastest alkyl halide among the three classes of alcohols and the order of reactivity of these alcohols with Lucas reagents is  $3^\circ > 2^\circ > 1^\circ$ .

42. For group 16 elements, the hydrides with higher molar mass (e.g.  $\text{H}_2\text{Po}$ ) are less thermally stable than hydride with lower molar mass (e.g.  $\text{H}_2\text{O}$ ). This is due to the



increase in size of central atom which results to the weakening of  $M-H$  bond due to increased bond length.

Thus, the correct order of thermal stability for  $H_2E$  ( $E = O, S, Se, Te$  and  $Po$ ) is as follows :

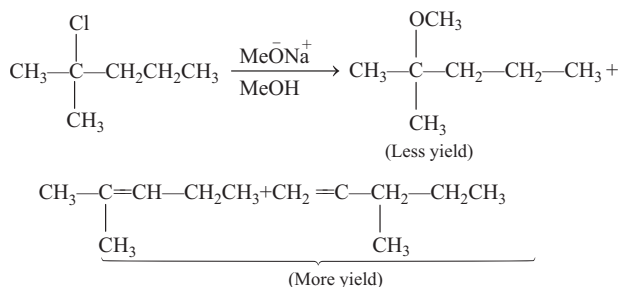


43. Statement (b) is correct while the other statements are incorrect. The corrected form are as follows :

Fructose has the molecular formula  $C_6H_{12}O_6$ . It belongs to D-series and is a laevorotatory compound. It also exists in two cyclic forms which are obtained by the addition of  $-OH$  at C-5 to the  $\left(\begin{array}{c} \diagup \\ \diagdown \end{array} C=O\right)$  group.

The ring, thus formed is a five membered ring and is named as furanose with analogy to the compound furan. Furan is a five membered cyclic compound with one oxygen and four carbon atoms.

44. When 2-chloro-2-methylpentane reacts with sodium methanoxide in methanol then following reaction takes place :



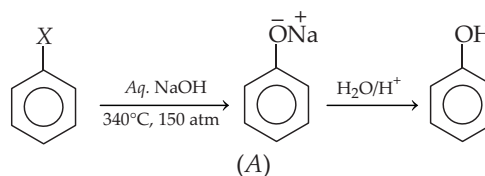
45. Assertion is true but Reason is false. Correct Reason is as follows:  
The cold union has lower vapour pressure of its volatile content.
46. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
47. Assertion is false but Reason is true. Correct Assertion is as follows :  
2-pentanol can be distinguished from 3-pentanol by iodoform test.

48. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

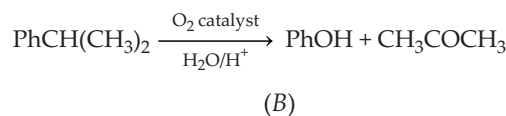
49. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

50. (a) Only analogy given in option (a) is correct, rest of them are incorrect. The correct forms are as follows :
- (b) Orthorhombic :  $a = b \neq c; \alpha = \beta = \gamma = 90^\circ$ ,  
Tetragonal :  $a = b \neq c; \alpha = \beta = \gamma = 90^\circ$
- (c) bcc : Total number of atoms is 2 : : fcc : Total number of atoms is 4.
- (d) hcp : Packing efficiency is 74% : :  
bcc : Packing efficiency is 68%.

51. Dows process :



- Cumene process :



52.  $A \rightarrow (3), B \rightarrow (1), C \rightarrow (4), D \rightarrow (2)$
53. In KCl, the size of anions and cations are similar, hence, it does not show Frenkel defect.
54. FeO is an example of metal deficiency defect because  $\text{Fe}^{2+}$ -cations are missing from the FeO crystal and the loss of positive charge is made up by  $\text{Fe}^{3+}$  ions.
55. Schottky defect in a crystal is observed when unequal number of anion and cation are missing from the lattice and the vacant positions cause imperfection or defect in crystal.