

Sample Question Paper, 2021-22

(Issued by CBSE Board on 14th January, 2022)

TERM-II

CHEMISTRY

SOLVED

Time allowed : 2 Hours

Max. Marks : 35

General Instructions :

- There are 12 questions in this question paper with internal choice.
- SECTION A - Q. No. 1 to 3 are very short answer questions carrying 2 marks each.
- SECTION B - Q. No. 4 to 11 are short answer questions carrying 3 marks each.
- SECTION C - Q. No. 12 is case based question carrying 5 marks.
- All questions are compulsory.
- Use of log tables and calculators is not allowed

Section - A

- Arrange the following in the increasing order of their property indicated (any two): [1×2=2]
 - Benzoic acid, Phenol, Picric acid, Salicylic acid (pK_a values).
 - Acetaldehyde, Acetone, Methyl tert butyl ketone (reactivity towards NH_2OH).
 - ethanol, ethanoic acid, benzoic acid (boiling point)
- Solutions of two electrolytes 'A' and 'B' are diluted. The Λ_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. Graphically show the behaviour of 'A' and 'B'. [2]
- Give reasons to support the answer: [2]
 - Presence of alpha hydrogen in aldehydes and ketones is essential for aldol condensation.
 - 3-Hydroxy pentan-2-one shows positive Tollen's test.

Section - B

- Account for the following:
 - Aniline cannot be prepared by the ammonolysis of chlorobenzene under normal conditions.
 - N-ethylethanamine boils at 329.3K and butanamine boils at 350.8K, although both are isomeric in nature.
 - Acylation of aniline is carried out in the presence of pyridine. [1×3=3]

OR

Convert the following:

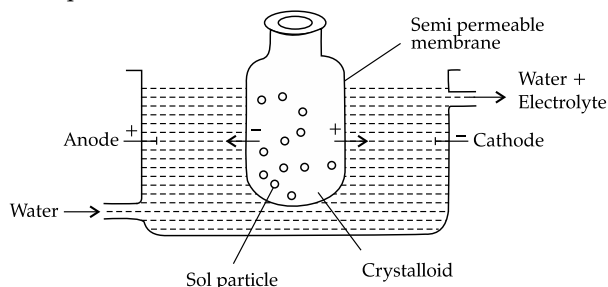
- Phenol to N-phenylethanamide.
 - Chloroethane to methanamine.
 - Propanenitrile to ethanal. [1×3=3]
- Answer the following questions:
 - $[Ni(H_2O)_6]^{2+}$ (aq) is green in colour whereas $[Ni(H_2O)_4(en)]^{2+}$ (aq) is blue in colour, give reason in support of your answer .
 - Write the formula and hybridization of the following compound:
tris(ethane-1,2-diamine) cobalt(III) sulphate [1+2]

OR

In a coordination entity, the electronic configuration of the central metal ion is $t_{2g}^3 e_g^1$

- Is the coordination compound a high spin or low spin complex?
 - Draw the crystal field splitting diagram for the above complex. [1+2]
- Account for the following:
 - Ti(IV) is more stable than Ti (II) or Ti(III).
 - In case of transition elements, ions of the same charge in a given series show progressive decrease in radius with increasing atomic number.
 - Zinc is comparatively a soft metal, iron and chromium are typically hard. [1×3=3]

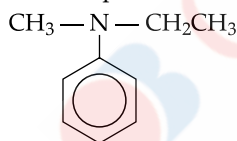
7. An alkene 'A' (Mol. formula C_5H_{10}) on ozonolysis gives a mixture of two compounds 'B' and 'C'. Compound 'B' gives positive Fehling's test and also forms iodoform on treatment with I_2 and $NaOH$. Compound 'C' does not give Fehling's test but forms iodoform. Identify the compounds A, B and C. Write the reaction for ozonolysis and formation of iodoform from B and C. [3]
8. Observe the figure given below and answer the questions that follow: [3]



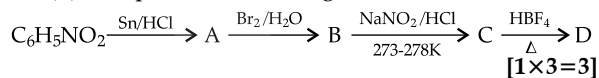
- (a) Which process is represented in the figure?
 (b) What is the application of this process?
 (c) Can the same process occur without applying electric field? Why is the electric field applied?
9. What happens when reactions:
 (a) N-ethylethanamine reacts with benzenesulphonyl chloride.
 (b) Benzylchloride is treated with ammonia followed by the reaction with Chloromethane.
 (c) Aniline reacts with chloroform in the presence of alcoholic potassium hydroxide. [1×3=3]

OR

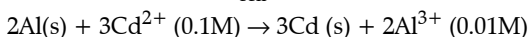
- (a) Write the IUPAC name for the following organic compound:



- (b) Complete the following:



10. Represent the cell in which the following reaction takes place. The value of E° for the cell is 1.260 V. What is the value of E_{cell} ?



[3]

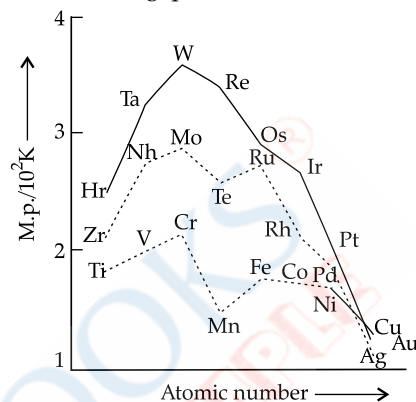
11. (a) Why are fluorides of transition metals more stable in their higher oxidation state as compared to the lower oxidation state?
 (b) Which one of the following would feel attraction when placed in magnetic field: Co^{2+} , Ag^+ , Ti^{4+} , Zn^{2+} ?

- (c) It has been observed that first ionization energy of 5d series of transition elements are higher than that of 3d and 4d series, explain why?

[1×3=3]

OR

On the basis of the figure given below, answer the following questions:



- (a) Why manganese has lower melting point than chromium?
 (b) Why do transition metals of 3d series have lower melting points as compared to 4d series?
 (c) In the third transition series, identify and name the metal with the highest melting point.

[1×3=3]

Section - C

12. Read the passage given below and answer the questions that follow.

Are there nuclear reactions going on in our bodies?

There are nuclear reactions constantly occurring in our bodies, but there are very few of them compared to the chemical reactions, and they do not affect our bodies much. All of the physical processes that take place to keep a human body running are chemical processes. Nuclear reactions can lead to chemical damage, which the body may notice and try to fix. The nuclear reaction occurring in our bodies is radioactive decay. This is the change of a less stable nucleus to a more stable nucleus. Every atom has either a stable nucleus or an unstable nucleus, depending on how big it is and on the ratio of protons to neutrons. The ratio of neutrons to protons in a stable nucleus is thus around 1:1 for small nuclei ($Z < 20$). Nuclei with too many neutrons, too few neutrons, or that are simply too big are unstable. They eventually transform to a stable form through radioactive decay. Wherever there are atoms with unstable nuclei (radioactive atoms), there are nuclear reactions occurring naturally. The interesting thing is that there are small amounts of radioactive atoms everywhere: in your chair, in the ground, in the food you eat, and yes, in your body.

The most common natural radioactive isotopes in humans are carbon-14 and potassium-40. Chemically, these isotopes behave exactly like stable carbon and potassium. For this reason, the body uses carbon-14 and potassium-40 just like it does normal carbon and potassium; building them into the different parts of the cells, without knowing that they are radioactive. In time, carbon-14 atoms decay to stable nitrogen atoms and potassium-40 atoms decay to stable calcium atoms. Chemicals in the body that relied on having a carbon-14 atom or potassium-40 atom in a certain spot will suddenly have a nitrogen or calcium atom. Such a change damages the chemical. Normally, such changes are so rare, that the body can repair the damage or filter away the damaged chemicals.

The natural occurrence of carbon-14 decay in the body is the core principle behind carbon dating. As long as a person is alive and still eating, every carbon-14 atom that decays into a nitrogen atom is replaced on average with a new carbon-14 atom. But once a person dies, he stops replacing the decaying carbon-14 atoms. Slowly the carbon-14 atoms decay to nitrogen without being replaced, so that there is less and less carbon-14 in a dead body. The rate at which carbon-14 decays is constant and follows first order kinetics. It has a half - life of nearly 6000 years, so by measuring the relative amount of carbon-14 in a bone, archeologists can calculate when the person died. All living organisms consume

carbon, so carbon dating can be used to date any living organism, and any object made from a living organism. Bones, wood, leather, and even paper can be accurately dated, as long as they first existed within the last 60,000 years. This is all because of the fact that nuclear reactions naturally occur in living organisms.

(Source: The textbook Chemistry: The Practical Science by Paul B. Kelter, Michael D. Mosher and Andrew Scott states)

- Why is Carbon -14 radioactive while Carbon -12 not? (Atomic number of Carbon: 6)
- Researchers have uncovered the youngest known dinosaur bone, dating around 65 million years ago. How was the age of this fossil estimated?
- Which are the two most common radioactive decays happening in human body?
- Suppose an organism has 20 g of Carbon -14 at its time of death. Approximately how much Carbon -14 remains after 10,320 years? (Given $\text{antilog } 0.517 = 3.289$)

OR

- Approximately how old is a fossil with 12 g of Carbon -14 if it initially possessed 32 g of Carbon-14? (Given $\log 2.667 = 0.4260$)

[1+1+1+2]

□□□

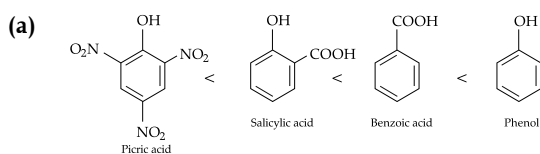
CBSE Marking Scheme Answers 2021-2022 (Issued by Board)

Section - A

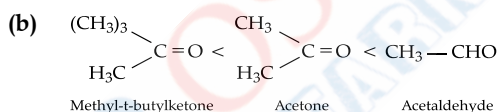
1. (a) Picric acid < salicylic acid < benzoic acid < phenol [1]

(b) Methyl tert - butyl ketone < acetone < Acetaldehyde [1]

Detailed Answer:



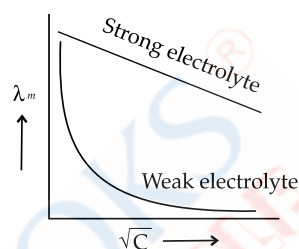
Out of picric acid, salicylic acid, benzoic acid and phenol, picric acid is the strongest acid due to the presence of three $-\text{NO}_2$ group. $-\text{NO}_2$ group is an electron withdrawing group and an electron withdrawing group on a benzene ring enhances the acidic character. Out of salicylic acid and benzoic acid, salicylic acid will have more stable conjugate base and hence, more acidic than benzoic acid and stronger will be the acid, lower will be its $\text{p}K_a$ value. [1]



Acetaldehyde is more reactive than acetone towards nucleophilic addition reaction as acetaldehyde have only one $-\text{CH}_3$ group and acetone have two $-\text{CH}_3$ group, so +I effect is more in acetone and acetone is also more sterically hindered than acetaldehyde. If we compare methyl-t-butyl ketone and acetone, then, the former one has a very large +I effect and is very much sterically hindered, so least reactive towards NH_4OH . [1]

(c) Ethanol < Ethanoic acid < Benzoic acid (boiling point of carboxylic acids is higher than alcohols due to extensive hydrogen bonding, boiling point increases with increase in molar mass) [1]

2. B is a strong electrolyte. The molar conductivity increases slowly with dilution as there is no increase in number of ions on dilution as strong electrolytes are completely dissociated. [$\frac{1}{2} + \frac{1}{2}$]



3. (a) The alpha hydrogen atoms are acidic in nature due to presence of electron withdrawing carbonyl group. These can be easily removed by a base and the carbanion formed is resonance stabilized. [1]

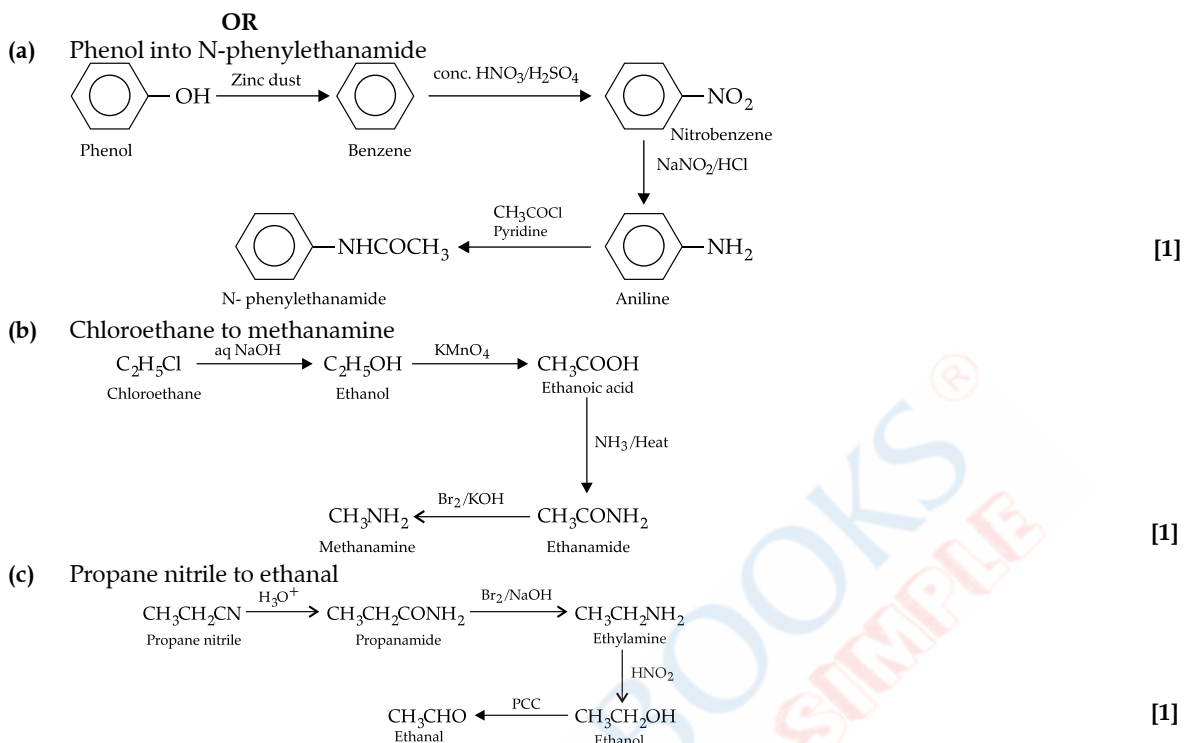
(b) Tollen's reagent is a weak oxidizing agent, not capable of breaking the C-C bond in ketones. Thus, ketones cannot be oxidized using Tollen's reagent itself gets reduced to Ag. [1]

Section - B

4. (a) In case of chlorobenzene, the C—Cl bond is quite difficult to break as it acquires a partial double bond character due to conjugation. So, under the normal conditions, ammonolysis of chlorobenzene does not yield aniline. [1]

(b) Primary and secondary amines are engaged in intermolecular association due to hydrogen bonding between nitrogen of one molecule and hydrogen of another molecule. Due to the presence of three hydrogen atoms, the intermolecular association is more in primary amines than in secondary amines as there are two hydrogen atoms available for hydrogen bond formation in it. [1]

(c) During the acylation of aniline, stronger base pyridine is added. This is done in order to remove the HCl so formed during the reaction and to shift the equilibrium to the right hand side. [1]



5. (a) The colour of coordination compound depends upon the type of ligand and $d-d$ transition taking place.

H_2O is weak field ligand, which causes small splitting, leading to the $d-d$ transition corresponding green colour, however due to the presence of (en) which is a strong field ligand, the splitting is increased. Due to the change in t_{2g} e_g splitting, the colouration of the compound changes from green to blue. [1]

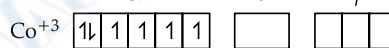
(b) Formula of the compound is $[\text{Co}(\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2)_3]_2(\text{SO}_4)_3$
Hybridisation of the compound: d^2sp^3 . [2]

Detailed Answer:

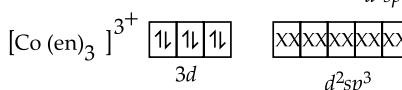
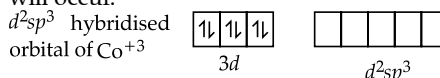
(b) $[\text{Co}(\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2)_3]_2(\text{SO}_4)_3$
Here, en is a neutral ligand.

Oxidation state of Co is +3.

Electronic configuration of $\text{Co} = [\text{Ar}]3d^74s^2$
Electronic configuration of $\text{Co}^{+3} = [\text{Ar}]3d^6$



en is strong field ligand so back pairing of electrons will occur.

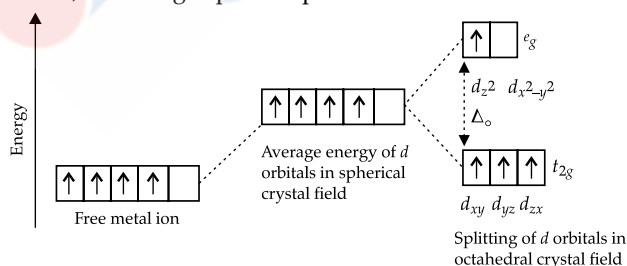


6 pairs of e^- from three en ligand

So, hybridization of $[\text{Co}(\text{en})_3]_2(\text{SO}_4)_3$ is d^2sp^3 [2]

OR

(a) As the fourth electron enters one of the e_g orbitals giving the configuration $t_{2g}^3 e_g^1$, which indicates $\Delta_o < P$ hence, forms high spin complex. [1]



6. (a) Ti is having electronic configuration $[\text{Ar}] 3d^2 4s^2$. Ti (IV) is more stable as Ti^{4+} acquires nearest noble gas configuration on loss of 4 e^- . [1]

(b) In case of transition elements, ions of the same charge in a given series show progressive decrease in radius with increasing atomic number.

As the new electron enters a d orbital each time, the nuclear charge increases by unity.

The shielding effect of a d electron is not that effective, hence the net electrostatic attraction between the nuclear charge and the outermost electron increases and the ionic radius decreases. [1]

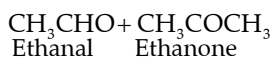
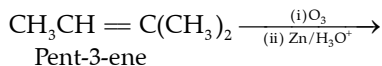
(c) Iron and Chromium are having high enthalpy of atomization due to the presence of unpaired electrons, which accounts for their hardness. However, zinc has low enthalpy of atomization as it has no unpaired

electron. Hence, zinc is comparatively a soft metal. [1]

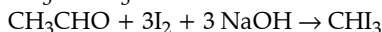
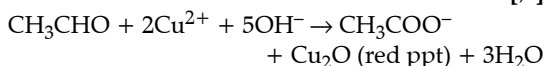
7. Compound A is an alkene, on ozonolysis it will give carbonyl compounds. As both B and C have, $>C=O$ group, B gives positive Fehling's test so it is an aldehyde and it gives iodoform test so, it has $CH_3C=O$ group. This means that aldehyde is acetaldehyde.

C does not give Fehling's test, so it is a ketone. It gives positive iodoform test so it is a methyl ketone means it has $CH_3C=O$ group.

Compound A (C_5H_{10}) on ozonolysis gives B (CH_3CHO) + C (CH_3COR). So, "C" is CH_3COCH_3 .

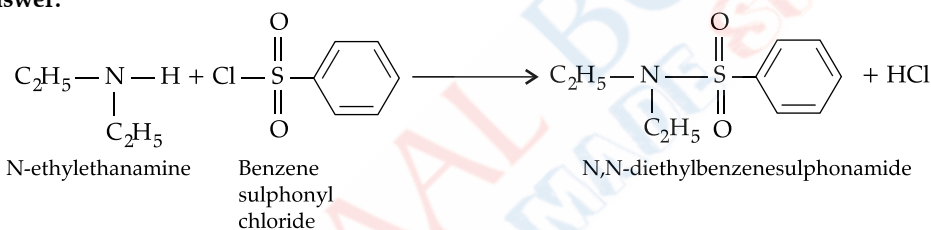


[1/2]

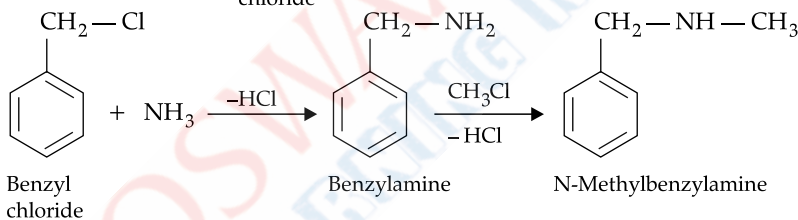


Detailed Answer:

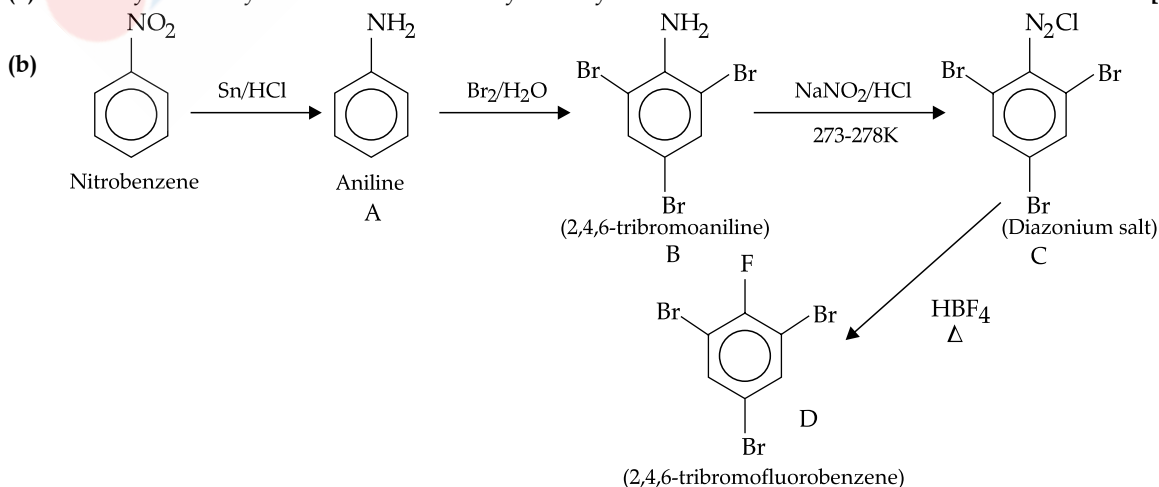
(a)



(b)

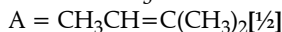
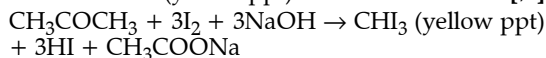
**OR**

(a) N-Ethyl-N-methylbenzenamine or N-Ethyl-N-ethylaniline [1]

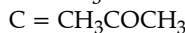


[1/2]

(yellow ppt) + 3HI + HCOONa [1/2]



[1/2]



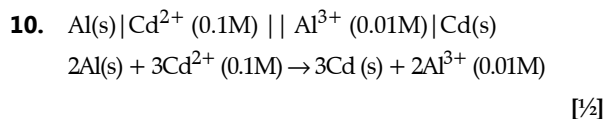
[1/2]

8. (a) Electrodialysis [1]
 (b) Purification of colloidal solution [1]
 (c) Yes, dialysis is a very slow process, To increase speed of dialysis, electric field is applied. [1/2+1/2]

9. (a) When N-ethylethanamine reacts with benzenesulphonyl chloride, N,N-diethylbenzenesulphonamide is formed. [1]

- (b) When benzylchloride is treated with ammonia, benzylamine is formed which on reaction with chloromethane yields a secondary amine, N-methylbenzylamine. [1/2+1/2]

- (c) When aniline reacts with chloroform in the presence of alcoholic potassium hydroxide, phenyl isocyanides or phenyl isonitrile is formed. [1]



$$E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.059}{n} \log \frac{[\text{Al}^{3+}]^2}{[\text{Cd}^{2+}]^3} \quad [½]$$

$$E_{\text{cell}} = 1.26 - \frac{0.059}{6} \log \frac{(0.01)^2}{(0.1)^3} \quad [½]$$

$$= 1.26 - \frac{0.059(-1)}{6}$$

$$= 1.26 + 0.009$$

$$= 1.269 \text{ V} \quad [1+½]$$

11. (a) The ability of fluorine to stabilize the highest oxidation state is attributed to the higher lattice energy or high bond enthalpy. [1]
 (b) Co^{2+} has three unpaired electrons so, it would be paramagnetic in nature, hence Co^{2+} ion would be attracted to magnetic field. [1]
 (c) The transition elements of 5d series have intervening 4f orbitals. There is greater effective nuclear charge acting on outer valence electrons due to the weak shielding by 4f electrons. Hence, first ionisation energy of 5d series of transition elements are higher than that of 3d and 4d series. [1]

OR

- (a) With increase in unpaired electrons, melting point increases. In Mn ($3d^2 4s^2$), pairing starts after Cr ($3d^5 4s^1$). Thus, there is weak metallic bonding further due to less unpaired electrons. It reduces enthalpy of atomization value. Hence, manganese has lower melting point than chromium. [1]
 (b) There is much more frequent metal – metal bonding in compounds of the heavy transition metals i.e., 4d and 5d series, which accounts for lower melting point of 3d series. [1]
 (c) Tungsten [1]

Section - C

12. (a) Ratio of neutrons to protons is 1.3:1 which is not the stable ratio of 1:1 [1]
 (b) Age of fossils can be estimated by C-14 decay. All living organisms have C-14 which

decays without being replaced back once the organism dies. [1]

- (c) Carbon-14 atoms decay to stable nitrogen atoms and potassium-40 atoms decay to stable calcium. [1]

$$(d) t = 2.303/k \log (C_0/C_t) \quad [½]$$

$$C_0 = 20 \text{ g}, C_t = ? \quad [½]$$

$t = 10320$ years; $k = 0.693/6000$ (half-life given in passage)

Substituting in equation: [½]

$$10320 = 2.303 / (0.693/6000) \log 20 / C_t$$

$$0.517 = \log 20 / C_t \text{ antilog } (0.517) = 20/C_t$$

$$3.289 = 20/C_t \quad [½]$$

$$C_t = 6.17 \text{ g}$$

Detailed Answer:

$$[A_0] = 20\text{g}; [A] = ?$$

$$t = 10,320 \text{ years}$$

$$t_{1/2} = 6000 \text{ years (given in passage)}$$

$$\text{So, } k = \frac{0.693}{t_{1/2}} = \frac{0.693}{6000}$$

$$= 0.0001155 \text{ years}^{-1}$$

$$\text{Now, } k = \frac{2.303}{t} \log \frac{[A_0]}{[A]}$$

$$0.0001155 = \frac{2.303}{10320} \log \frac{20}{[A]}$$

$$0.517 = \log \frac{20}{[A]}$$

$$\text{antilog } (0.517) = \frac{20}{[A]}$$

$$3.289 = 20/[A]$$

$$[A] = 6.08\text{g}$$

So, 6.08g of carbon-14 remains after 10,320 years. [2]

OR

$$t = 2.303/k \log (C_0/C_t) \quad [½]$$

$$C_0 = 32 \text{ g}, C_t = 12$$

$t = ?, k = 0.693/6000$ (half life given in passage)
 substituting in equation:

$$t = 2.303/(0.693/6000) \log 32/12$$

$$t = 2.303 \times 6000/0.693 \log 2.667 \quad [½]$$

$$t = 2.303 \times 6000 \times 0.4260/0.693 \quad [½]$$

$$= 8494 \text{ years} \quad [½]$$



Solved Paper, 2021-2022

CHEMISTRY

Term-I, Set-4

Series : SSK/3

Question Paper
Code No. 056/3/4

Time allowed : 90 Minutes

Max. Marks : 35

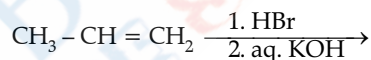
General Instructions :

- This question paper contains 55 questions out of which 45 questions are to be attempted.
- All questions carry equal marks.
- This question paper consists of three Sections – Section A, B and C.
- Section A contains 25 questions. Attempt any 20 questions from Q. No. 01 to 25.
- Section B contains 24 questions. Attempt any 20 questions from Q. No. 26 to 49.
- Section C contains 6 questions. Attempt any 5 questions from Q. No. 50 to 55.
- The first 20 questions attempted in Section A and Section B and first 5 questions attempted in Section C by a candidate will be evaluated.
- There is only one correct option for every multiple choice questions (MCQ). Marks will not be awarded for answering more than one option.
- There is no negative marking.

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.

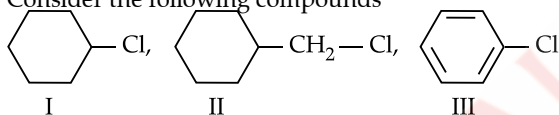
- Which one of the following pairs will form an ideal solution?
(A) chloroform and acetone
(B) ethanol and acetone
(C) n-hexane and n-heptane
(D) phenol and aniline
- Which of the following is known as amorphous solid?
(A) Glass
(B) Plastic
(C) Rubber
(D) All of the above
- The structure of pyrosulphuric acid is
(A) $\begin{array}{c} \text{O} \\ \parallel \\ \text{HO}-\text{S}-\text{O}-\text{OH} \end{array}$
(B) $\begin{array}{c} \text{O} \\ \parallel \\ \text{HO}-\text{S}-\text{OH} \end{array}$
(C) $\begin{array}{c} \text{O} \quad \quad \text{O} \\ \parallel \quad \quad \parallel \\ \text{HO}-\text{S}-\text{O}-\text{S}-\text{OH} \\ \parallel \quad \quad \parallel \\ \text{O} \quad \quad \text{O} \end{array}$
(D) $\begin{array}{c} \text{O} \quad \quad \quad \text{O} \\ \parallel \quad \quad \quad \parallel \\ \text{HO}-\text{S}-\text{O}-\text{O}-\text{S}-\text{OH} \\ \parallel \quad \quad \quad \parallel \\ \text{O} \quad \quad \quad \text{O} \end{array}$
- The C — O — H bond angle in alcohol is
(A) slightly greater than $109^\circ 28'$.
(B) slightly less than $109^\circ 28'$.
(C) slightly greater than 120° .
(D) slightly less than 120° .
- Consider the following reaction



The major end product is

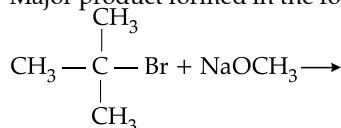
- $\text{CH}_3 - \text{CH} - \text{CH}_3$
|
OH
 - $\text{CH}_3 - \text{CH} - \text{CH}_3$
|
Br
 - $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{OH}$
 - $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Br}$
- Nucleoside are composed of
(A) a pentose sugar and phosphoric acid.
(B) a nitrogenous base and phosphoric acid.
(C) a nitrogenous base and a pentose sugar.
(D) a nitrogenous base, a pentose sugar and phosphoric acid.
 - The oxidation state - 2 is most stable in
(A) O
(B) S
(C) Se
(D) Te
 - Which of the following is not a characteristic of a crystalline solid?
(A) A true solid
(B) A regular arrangement of constituent particles
(C) Sharp melting point
(D) Isotropic in nature
 - Which of the following formula represents Raoult's law for a solution containing non-volatile solute?
(A) $p_{\text{solute}} = p^\circ_{\text{solute}} \cdot x_{\text{solute}}$
(B) $p = K_{\text{H}} \cdot x$
(C) $p_{\text{Total}} = p_{\text{solvent}}$
(D) $p_{\text{solute}} = p^\circ_{\text{solvent}} \cdot x_{\text{solvent}}$
 - An azeotropic solution of two liquids has a boiling point lower than either of the two when it
(A) shows a positive deviation from Raoult's law.
(B) shows a negative deviation from Raoult's law.
(C) shows no deviation from Raoult's law.
(D) is saturated.
 - Which of the following crystal will show metal excess defect due to extra cation?

- (A) AgCl (B) NaCl
(C) FeO (D) ZnO
12. Which of the following acids reacts with acetic anhydride to form a compound Aspirin?
(A) Benzoic acid (B) Salicylic acid
(C) Phthalic acid (D) Acetic acid
13. Which of the following statements is wrong?
(A) Oxygen shows $p\pi-p\pi$ bonding.
(B) Sulphur shows little tendency of catenation.
(C) Oxygen is diatomic whereas sulphur is polyatomic.
(D) O-O bond is stronger than S-S bond.
14. Amino acids which cannot be synthesized in the body and must be obtained through diet are known as
(A) Acidic amino acids
(B) Essential amino acids
(C) Basic amino acids
(D) Non-essential amino acids
15. Which one of the following halides contains $C_{sp^2}-X$ bond?
(A) Allyl halide (B) Alkyl halide
(C) Benzyl halide (D) Vinyl halide
16. On mixing 20 ml of acetone with 30 ml of chloroform. The total volume of the solution is
(A) <50 ml (B) =50 ml
(C) >50 ml (D) =10 ml
17. Consider the following compounds

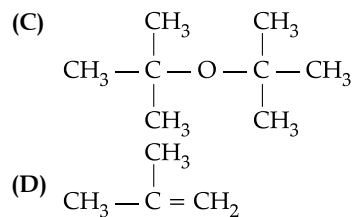


The correct order of reactivity towards S_N2 reaction

- (A) I>III>II (B) II>III>I
(C) II>I>III (D) III>I>II
18. Which of the following forms strong $p\pi - p\pi$ bonding?
(A) S_8 (B) Se_6
(C) Te_4 (D) O_2
19. F_2 acts as a strong oxidising agent due to
(A) low $\Delta_{bond} H^\circ$ and low $\Delta_{hyd} H^\circ$
(B) low $\Delta_{bond} H^\circ$ and high $\Delta_{hyd} H^\circ$
(C) high $\Delta_{bond} H^\circ$ and high $\Delta_{eg} H^\circ$
(D) low $\Delta_{hyd} H^\circ$ and low $\Delta_{eg} H^\circ$
20. Which of the following sugar is known as dextrose?
(A) Glucose (B) Fructose
(C) Ribose (D) Sucrose
21. Cu reacts with dilute HNO_3 to evolve which gas?
(A) N_2O (B) NO_2
(C) NO (D) N_2
22. Which of the following is a network solid?
(A) SO_2 (B) SiO_2
(C) CO_2 (D) H_2O
23. Major product formed in the following reaction



- (A) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{ONa} \\ | \\ \text{CH}_3 \end{array}$ (B) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{OCH}_3 \\ | \\ \text{CH}_3 \end{array}$



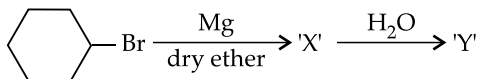
24. Chlorine reacts with cold and dilute NaOH to give
(A) NaCl and NaClO_3
(B) NaCl and NaClO
(C) NaCl and NaClO_4
(D) NaClO and NaClO_3
25. Elevation of boiling point is inversely proportional to
(A) molal elevation constant (K_b)
(B) molality (m)
(C) molar mass of solute (M)
(D) weight of solute (W)

Section-B

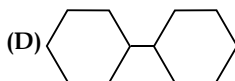
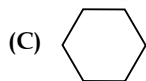
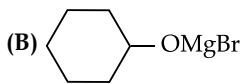
This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, only first 20 will be considered for evaluation.

26. An unknown gas 'X' is dissolved in water at 2.5 bar pressure and has mole fraction 0.04 in solution. The mole fraction of 'X' gas when the pressure of gas is doubled at the same temperature is
(A) 0.08 (B) 0.04
(C) 0.02 (D) 0.92
27. The base which is present in DNA but not in RNA,
(A) Cytosine (B) Guanine
(C) Adenine (D) Thymine
28. In the following reaction
 $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{OH} \xrightarrow{\text{PCC}}$
the product formed is:
(A) $\text{CH}_3 - \text{CHO}$ and $\text{CH}_3\text{CH}_2\text{OH}$
(B) $\text{CH}_3 - \text{CH} = \text{CH} - \text{COOH}$
(C) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CHO}$
(D) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CHO}$
29. Enantiomers differ only in
(A) boiling point
(B) rotation of polarized light
(C) melting point
(D) solubility
30. The number of lone pairs of electrons in XeF_4 is
(A) zero (B) one
(C) two (D) three
31. Sulphuric acid is used to prepare more volatile acids from their corresponding salts due to its
(A) strong acidic nature
(B) low volatility
(C) strong affinity for water
(D) ability to act as a dehydrating agent
32. An element with density 6 g cm^{-3} forms a fcc lattice with edge length of $4 \times 10^{-8} \text{ cm}$. The molar mass of the element is ($N_A = 6 \times 10^{23} \text{ mol}^{-1}$)
(A) 57.6 g mol^{-1} (B) 28.8 g mol^{-1}
(C) 82.6 g mol^{-1} (D) 62 g mol^{-1}

33. In the reaction



compound 'Y' is



34. Which of the following is the weakest reducing agent in group 15?



35. The boiling point of a 0.2 m solution of a non-electrolyte in water is (K_b for water = 0.52 K kg mol⁻¹)

(A) 100°C

(B) 100.52°C

(C) 100.104°C

(D) 100.26°C

36. Nucleic acids are polymer of

(A) amino acids

(B) nucleosides

(C) nucleotides

(D) glucose

37. Which of the following gas dimerises to become stable?

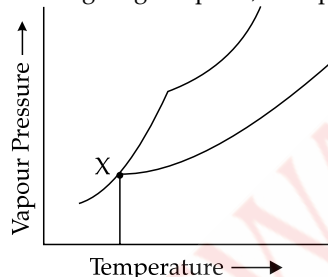
(A) CO_2 (g)

(B) NO_2 (g)

(C) SO_2 (g)

(D) N_2O (g)

38. In the following diagram point, 'X' represents



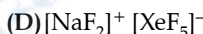
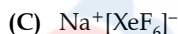
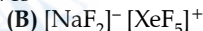
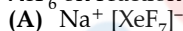
(A) Boiling point of solution

(B) Freezing point of solvent

(C) Boiling point of solvent

(D) Freezing point of solution

39. XeF_6 on reaction with NaF gives



40. Glucose on reaction with Br_2 water gives

(A) Saccharic acid

(B) Hexanoic acid

(C) Gluconic acid

(D) Salicylic acid

41. Which of the following is optically inactive?

(A) (+) – Butan-2-ol

(B) (-) – Butan-2-ol

(C) (±) – Butan-2-ol

(D) (+) – 2-Bromobutane

42. Which of the following is not a correct statement?

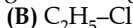
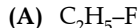
(A) Halogens are strong oxidising agents.

(B) Halogens are more reactive than interhalogens.

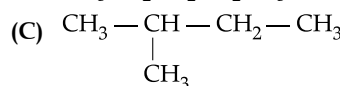
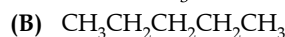
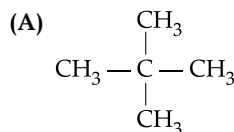
(C) All halogens are coloured.

(D) Halogens have maximum negative electron gain enthalpy.

43. Which of the following has highest boiling point?



44. Which of the following isomer of pentane (C_5H_{12}) will give three isomeric monochlorides on photochemical chlorination?



(D) All of the above

Given below are the questions (45-49) labelled as Assertion (A) and Reason (R). Select the most appropriate answer from the options 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):** A raw mango placed in a saline solution loses water and shrivel into pickle.

Reason (R): Through the process of reverse osmosis, raw mango shrivel into pickle.

46. **Assertion (A):** H_2S is less acidic than H_2Te .

Reason (R): H-S bond has more $\Delta_{\text{bond}} \text{H}^\circ$ than H-Te bond.

47. **Assertion (A):** Chlorobenzene is less reactive towards nucleophilic substitution reaction.

Reason (R): Nitro group in chlorobenzene increases its reactivity towards nucleophilic substitution reaction.

48. **Assertion (A):** Due to Schottky defect, there is no effect on the density of a solid.

Reason (R): Equal number of cations and anions are missing from their normal sites in Schottky defect.

49. **Assertion (A):** Fluorine forms only one oxoacid HOF.

Reason (R): Fluorine atom is highly electronegative.

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. Match the following:

	I		II
(i)	Stoichiometric defects	(a)	Crystalline solids
(ii)	Long range order	(b)	F- centres
(iii)	...ABC ABC ABC....	(c)	Schottky and Frenkel defects
(iv)	Number of atoms per unit cell=2	(d)	fcc structure
(v)	Metal excess defect due to anionic vacancies		

Which of the following is the best matched options?

(A) (i)-(d), (ii)-(a), (iii)-(b), (iv)-(c)

(B) (i)-(c), (ii)-(a), (iii)-(d), (v)-(b)

(C) (i)-(c), (ii)-(a), (iii)-(d), (iv)-(b)

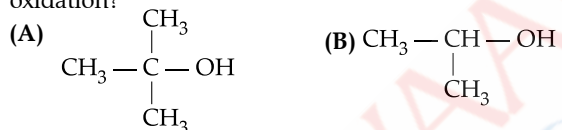
(D) (i)-(a), (ii)-(b), (v)-(c), (iv)-(d)

51. Which of the following analogies is correct?
 (A) XeF_2 : linear:: XeF_6 : square planar
 (B) moist SO_2 : Reducing agent:: Cl_2 : bleaching agent
 (C) N_2 : Highly reactive gas:: F_2 : inert at room temperature
 (D) NH_3 : strong base:: HI: weak acid
52. Complete the following analogy:
 Curdling of milk : A :: α -helix : B
 (A) A: Primary structure
 B: Secondary structure
 (B) A: Denatured protein
 B: Primary structure
 (C) A: Secondary structure
 B: Denatured protein
 (D) A: Denatured protein
 B: Secondary structure

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

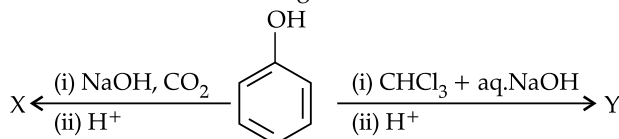
Alcohols and phenols are acidic in nature. Electron withdrawing groups in phenol increase its acidic strength and electron donating groups decrease. Alcohols undergo nucleophilic substitution with hydrogen halides to give alkyl halides. On oxidation primary alcohols yield aldehydes with mild oxidising agents and carboxylic acids with strong oxidising agents while secondary alcohols yield ketones. The presence of $-OH$ groups in phenols activates the ring towards electrophilic substitution. Various important products are obtained from phenol like salicylaldehyde, salicylic acid, picric acid, etc.

53. Which of the following alcohols is resistant to oxidation?



- (C) $CH_3 - CH_2 - OH$ (D) $CH_3 - OH$
 54. Which of the following group increases the acidic character of phenol?
 (A) CH_3O^- (B) CH_3^-
 (C) NO_2^- (D) All of these

55. Consider the following reaction



the products X and Y are

- (A) $X = \begin{array}{c} OH \\ | \\ \text{C}_6\text{H}_3 - COOH \end{array}$ $Y = \begin{array}{c} CHO \\ | \\ \text{C}_6\text{H}_3 - OH \end{array}$
 (B) $X = \begin{array}{c} OH \\ | \\ \text{C}_6\text{H}_3 - CHO \end{array}$ $Y = \begin{array}{c} OH \\ | \\ \text{C}_6\text{H}_3 - COOH \end{array}$
 (C) $X = \begin{array}{c} COOH \\ | \\ \text{C}_6\text{H}_3 - OH \end{array}$ $Y = \begin{array}{c} OH \\ | \\ \text{C}_6\text{H}_4 \end{array}$
 (D) $X = \begin{array}{c} OH \\ | \\ \text{C}_6\text{H}_3 - COOH \end{array}$ $Y = \begin{array}{c} CHO \\ | \\ \text{C}_6\text{H}_3 - OH \\ | \\ CHO \end{array}$

□□□

SOLUTIONS

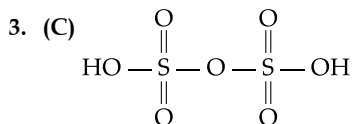
Section-A

1. (C) *n*-hexane and *n*-heptane

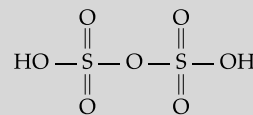
Explanation: *n*-hexane and *n*-heptane will form an ideal solution over entire range of concentrations as their intermolecular interactions (solute-solvent) after forming solution are similar to their intermolecular attractions (solute-solute, solvent-solvent) before mixing the components.

2. (D) All of the above

Explanation: Glass, plastic, rubber all are amorphous solids as they are non-crystalline solids in which the atoms and molecules are not organized in a definite lattice pattern.



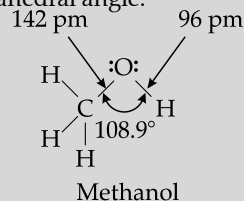
Explanation: $H_2S_2O_7$ is pyrosulphuric acid.

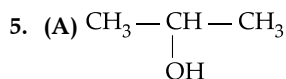


4. (B) slightly less than $109^\circ 28'$

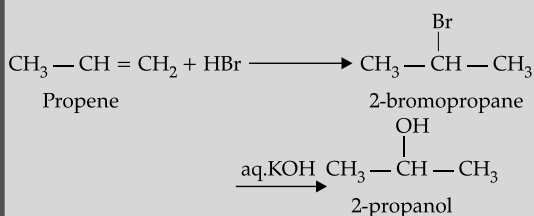
Explanation: C-O-H bond angle in alcohol is slightly less than $109^\circ 28'$.

The oxygen atom is sp^3 hybridised but because of the mutual repulsion of 2 lone pairs of electrons on it the resultant bond angle C-O-H is slightly less than the tetrahedral angle.



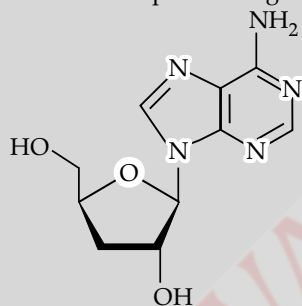


Explanation: Propene yields two products, however only one predominates as per Markovnikov's rule *i.e.*, 2-bromopropane which on heating with aq. KOH gives secondary alcohol. Aq. KOH is alkaline in nature so it gives hydroxide ion which is a nucleophile. It replaces halide (bromide in this case) ion and form alcohols.



6. (C) a nitrogenous base and a pentose sugar

Explanation: Nucleosides are composed of a nitrogenous base and a pentose sugar.



7. (A) O

Explanation: Group 16 elements (chalcogens) have six valence electrons each with general electronic configuration of ns^2np^4 . Highly electronegative oxygen shows -2 oxidation state as it accepts 2 electrons to complete its octet. However, down the group from S, Se, Te, Po the stability of -2 oxidation state decreases with decrease in the electronegativity of elements. They show +2, +4, +6 oxidation states.

8. (D) Isotropic in nature.

Explanation: Crystalline solids are anisotropic in nature *i.e.*, they possess different properties in different directions. However, they have a sharp melting point, regular geometry and are true solids.

9. (D) $p_{\text{solute}} = p_{\text{solvent}}^x$

Explanation: According to Raoult's law, the vapour pressure of a solution of a non-volatile solute is equal to the vapour pressure of the pure solvent at that temperature multiplied by its mole fraction.

10. (A) shows a positive deviation from Raoult's law

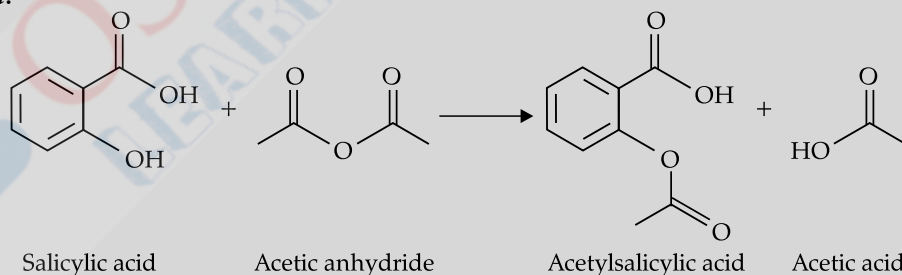
Explanation: An azeotropic mixture that has a boiling point lesser than its constituents is known as minimum boiling azeotropes and show positive deviation from Raoult's law.

11. (D) ZnO

Explanation: In metal excess defect due to cations, heating the compound releases extra cations which occupy the interstitial sites in crystals and the same number of electrons goes to neighbouring interstitial sites. *E.g.* ZnO.

12. (B) Salicylic acid

Explanation:



13. (B) Sulphur shows little tendency of catenation

Explanation: Oxygen is small in size therefore the lone pairs of electrons repel the O-O bond greatly as compared to lone pairs of electrons in S-S bond. Hence, S-S bond is stronger than the O-O bond and the sulphur shows greater tendency for catenation than oxygen.

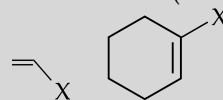
14. (B) Essential amino acids

Explanation: Amino acids which cannot be synthesized in the body are obtained through diet are called essential amino acids.

15. (D) Vinyl halide

Explanation: (A) Vinylic halides

These are the compounds in which the halogen atom is bonded to a sp^2 -hybridised carbon atom of a carbon-carbon double bond ($\text{C} = \text{C}$).



16. (B) = 50 ml

Explanation: There will be no change in volume on mixing chloroform and acetone. It will be:
 $20 + 30 = 50 \text{ ml}$

17. (B) II > III > I

Explanation: Chlorine exhibits -I effect, pulling electrons towards itself, thus creating a slight positive charge on the carbon attached.

In compound 2, -I effect of chlorine is most pronounced making the compound reactive towards S_N2 reaction.

In compound 3, -I effect of chlorine is strong but is countered by the resonance effect making substitution possible at *o*-, *p*- positions.

In compound 1, -I effect of chlorine is balanced by the +I effect of the cycloalkyl group.

18. (D) O_2

Explanation: Oxygen molecule has strong $p_\pi - p_\pi$ bonding.

19. (B) low $\Delta_{\text{bond}} H^\circ$ and high $\Delta_{\text{hyd}} H^\circ$

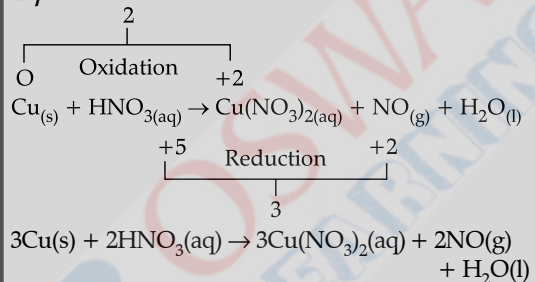
Explanation: Fluorine molecule has high hydration energy and low bond dissociation energy. That's why it acts as a strong oxidising agent.

20. (A) Glucose

Explanation: Glucose is known as dextrose.

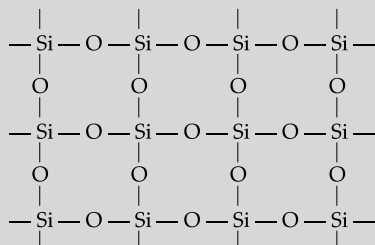
21. (C) NO

Explanation:

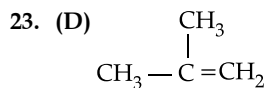


22. (B) SiO_2

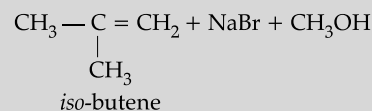
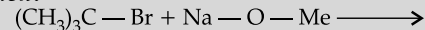
Explanation: SiO_2 is a network solid. A network solid or covalent network solid (also called atomic crystalline solids) is a chemical compound (or element) in which the atoms are bonded by covalent bonds in a continuous network extending throughout the material.



Three dimensional structure of SiO_2



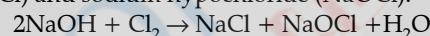
Explanation:



Tert-halide with strong base favours elimination reaction not the substitution reaction.

24. (B) NaCl and NaClO

Explanation: Chlorine reacts with cold and dilute NaOH to produce a mixture of sodium chloride (NaCl) and sodium hypochlorite (NaOCl).



25. (C) Molar mass of solute (M)

Explanation:

Boiling Point Elevation

$$\Delta T_b = K_b \times m \times i$$

Change in boiling point
 Molality of solution
 Molal elevation constant (0.51 °C/m for water)
 Van't Hoff factor

... (i)

$$m = \frac{x}{W} \times 1000$$

Molality

Where,

$$\text{Molality} = m$$

$$\text{Number of mole of solute} = x$$

$$\text{Weight of solvent in grams} = W \quad \dots \text{(ii)}$$

$$\text{Moles of solute} = \frac{\text{mass of solute}}{\text{molar mass of solute}} \quad \dots \text{(iii)}$$

From eq. (i), (ii), (iii), we derive that elevation of boiling point is inversely proportional to the molar mass of the solute.

SECTION-B

26. (A) 0.08

Explanation: Mole fraction of gas X in solution = 0.04

$$\text{Pressure} = 2.5 \text{ bar}$$

Let

$$p_1 = P_0 X_1$$

$$2.5 = 0.04 P_0 \quad \dots \text{(i)}$$

Let pressure be doubled, then p_2

$$5.0 = X_2 P_0 \quad \dots \text{(ii)}$$

Dividing Eqn ii by eqn I, we get

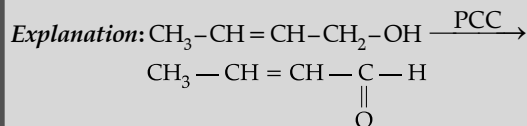
$$5.0/2.5 = X_2/0.04$$

$$2 \times 0.04 = X_2$$

$$X_2 = 0.08$$

27. (D) Thymine

Explanation: Instead of Thymine, RNA has Uracil as nitrogenous base.

28. (C) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CHO}$ 


Where PCC : Pyridinium chloro oxochromate.
PCC oxidises primary alcohols to aldehydes

29. (B) rotation of polarised light

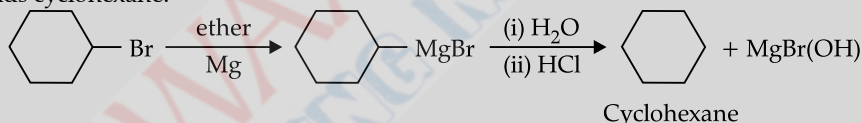
Explanation: Enantiomers are a pair of molecules that exist in two forms that are mirror images of one another but cannot be superimposed one upon the other. However, they differ in direction in which they rotate polarized light, either dextro (d or +) or levo (l or -), when dissolved in solution.

30. (C) two

Explanation: The XeF_4 (xenon tetrafluoride) molecule is hypervalent with six electron pairs around the central xenon (Xe) atom. Out of these, four are bonding pairs, and two are lone pairs.

33. (C) 

Explanation: Bromocyclohexane gives Grignard reagent on treatment with Mg and dry ether, which on hydrolysis yields cyclohexane.

34. (A) NH_3

Explanation: NH_3 is the weakest reducing agent in the hydrides of group 15. The reducing character of hydrides of group 15 elements increases from top to bottom because the Z-H strength (Here Z = N, P, As, Sb, or Br) bond decreases down the group due to an increase in the size of the central atom.

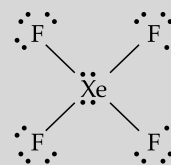
35. (C) 100.104°C

Explanation: Molality of solution = 0.2 m
 K_b of water = $0.52 \text{ K kg mol}^{-1}$

$$\Delta T_b = K_b \times m \times i$$

Change in boiling point \downarrow Molality of solution \downarrow Van't Hoff factor \downarrow

Molal elevation constant (0.51°C/m for water)



31. (B) low volatility

Explanation: Sulphuric acid has high boiling point so has low volatility hence, used to prepare more volatile acids.

32. (A) 57.6 g mol^{-1}

Explanation: Density of element $d = 6 \text{ g cm}^{-3}$
Edge length of FCC lattice, $a = 4 \times 10^{-8} \text{ cm}$
 $N_A = 6 \times 10^{23} \text{ mol}^{-1}$
 $z =$ no. of effective constituent particles in one unit cell
Density of cubic unit cell

$$d = \frac{zM}{a^3 N_A}$$

For an FCC, $z = 4$ $M = \frac{da^3 N_A}{z}$

$$M = 6 \times (4 \times 10^{-8})^3 \times 6 \times 10^{23} / 4 = 576 \times 10^{-1} = 57.6 \text{ g mol}^{-1}$$

For most non-electrolytes dissolved in water, the van't Hoff factor is essentially 1.

Hence, Elevation in Boiling point = $0.52 \times 0.2 = 0.104^\circ\text{C}$

Therefore,

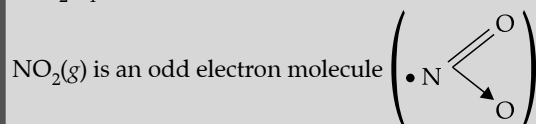
Boiling point = $100 + 0.104 = 100.104^\circ\text{C}$

36. (C) nucleotides

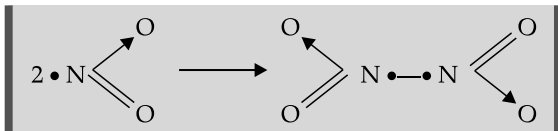
Explanation: Nucleic acids are polymers of nucleotides.

37. (B) NO_2 (g)

Explanation: In NO_2 structure, there is an unpaired electron on nitrogen atom, so it is reactive, hence it dimerises to pair up its electron and gains stability as N_2O_4 .



Hence, it undergoes dimerisation to form stable molecule with even number of electrons.



38. (A) Boiling point of solution

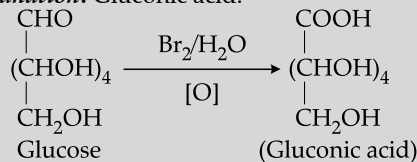
Explanation: Point X represents the boiling point of the solution.

39. (A) $\text{Na}^+[\text{XeF}_7]$

Explanation: $\text{XeF}_6 + \text{NaF} \rightarrow \text{Na}^+[\text{XeF}_7]^-$

40. (C) Gluconic acid

Explanation: Gluconic acid.



41. (C) (\pm) Butan-2-ol

Explanation: (+) Butan-2-ol is a racemic mixture so, it is optically inactive.

42. (B) Halogens are more reactive than inter halogens.

Explanation: Interhalogen compounds are more reactive than all halogens.

Halogens due to their tiny size and effective nuclear charge, are highly electronegative with low dissociation energies and high negative electron gain enthalpies. Therefore, they have a high tendency to gain an electron and act as strong oxidizing agents.

Halogens absorb different quanta of radiations that lie in the visible region. This typically results from the excitation of outer electrons to higher energy levels, resulting in different colours.

43. (D) $\text{C}_2\text{H}_5\text{-I}$

Explanation: For the same alkyl group the boiling points of haloalkanes are in the order of $\text{RF} < \text{RCI} < \text{RBr} < \text{RI}$

as with the increase in size of halogen atom the magnitude of van der Waals forces of attraction increases, resulting in higher boiling points.

44. (B) $\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$

Explanation: When alkanes larger than ethane are halogenated, isomeric products are formed.

45. (C) A is true but R is false.

Explanation: A raw mango placed in saline solution loses water and shrivels into pickle. Mango loses water due to osmosis and turns into a pickle.

46. (A) Both A and R are true and R is the correct Explanation of A.

Explanation: H_2S is less acidic than H_2Te as we move down the group the bond dissociation enthalpy decreases and it is easier to remove H^+ .

47. (B) Both A and R are true but R is not the correct explanation of A.

Explanation: Presence of nitro group on *ortho* or *para* position in the ring makes the ring more electron deficient and activated towards nucleophilic substitution reaction as compared to chlorobenzene.

48. (D) A is false but R is true.

Explanation: Equal number of cations and anions are missing from their normal sites in Schottky defect which leads to considerable decrease in density.

49. (B) Both A and R are true but R is not the correct explanation of A.

Explanation: Absence of *d*-orbitals in fluorine is the reason it doesn't form the oxoacids having higher oxidation states such as +3, +5, or +7. So, the +1 oxidation state is shown by fluorine only with the element oxygen. Thus, it forms only one oxoacid, HOF.

SECTION-C

50. (B) (i)-(c), (ii)-(a), (iii)-(d), (v)-(b)

Explanation: Schottky and Frenkel defects are stoichiometric defects.

Crystalline solids have long range order.

FCC structure is made up of layers of octahedral, -type planes. These stack in a sequence ABC ABC. Metal excess defects due to anionic vacancies is called F-centres.

51. (B) moist SO_2 ; Reducing agent:: Cl_2 ; bleaching agent

Explanation: The reducing character of sulphur dioxide is due to evolution of nascent hydrogen when it is moist.

Chlorine is a good bleaching agent, due to its oxidising properties because it produces nascent oxygen.

52. (D) A: Denatured protein B: Secondary structure

Explanation: Curdling of milk is denaturation of protein while alpha helix is a secondary structure of protein.

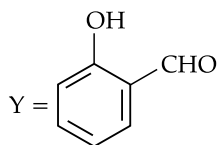
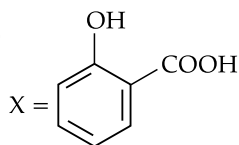
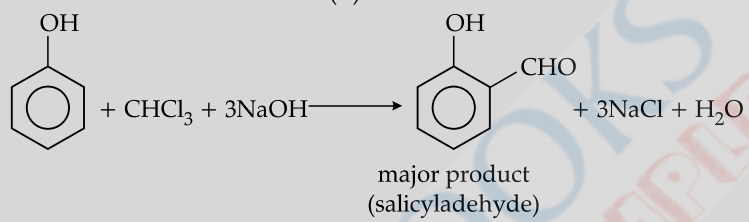
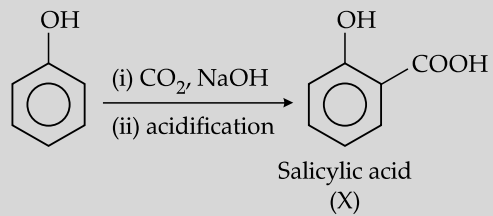
53. (A)
$$\begin{array}{c}
 \text{CH}_3 \\
 | \\
 \text{CH}_3 - \text{C} - \text{OH} \\
 | \\
 \text{CH}_3
 \end{array}$$

Explanation: *Tert* -alcohols are resistant to oxidation.

54. (C) NO_2^-

Explanation: NO_2 is an electron withdrawing group, hence it increases the acidic character of phenol.

55. (D)

**Explanation:**

○○○

Term – I

OMR SHEET

Booklet Series
A

Use English Numbers / Letters only. Use Blue / Black Ball Point Pen to write in box.

Booklet Series <input type="text"/>	Roll Number <input type="text"/>			Test Center Code <input type="text"/>
(A) (B) (C) (D)	0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 9 9 9 9 9 9 9 9 9 9	Name <input type="text"/>	Invigilator's Signature <input type="text"/>	<p>Proper Marking The OMR Sheet will be computer checked. Fill the circles completely and dark enough for proper detection. Use ballpen (black or blue) for marking.</p> <p>(A) (B) (C) (D)</p> <p>Avoid Improper Marking</p> <p>Partially Filled</p> <p>Lightly Filled</p>
Subject <input type="text"/>	Test Date <input type="text"/>	Student's Signature <input type="text"/>	Certified that all the entries in this section have been properly filled by the student	

IMPORTANT

The candidate should check that the Test Book Series printed on the OMR Sheet is the same as printed on the Test Booklet. In case of discrepancy, the candidate should immediately report the matter to the invigilator for replacement of both the Test Booklet and the Answer Sheet.

Darken the circle for each question.

Q.No.	Response	Q.No.	Response	Q.No.	Response	Q.No.	Response
01	(A) (B) (C) (D)	16	(A) (B) (C) (D)	31	(A) (B) (C) (D)	46	(A) (B) (C) (D)
02	(A) (B) (C) (D)	17	(A) (B) (C) (D)	32	(A) (B) (C) (D)	47	(A) (B) (C) (D)
03	(A) (B) (C) (D)	18	(A) (B) (C) (D)	33	(A) (B) (C) (D)	48	(A) (B) (C) (D)
04	(A) (B) (C) (D)	19	(A) (B) (C) (D)	34	(A) (B) (C) (D)	49	(A) (B) (C) (D)
05	(A) (B) (C) (D)	20	(A) (B) (C) (D)	35	(A) (B) (C) (D)	50	(A) (B) (C) (D)
06	(A) (B) (C) (D)	21	(A) (B) (C) (D)	36	(A) (B) (C) (D)	51	(A) (B) (C) (D)
07	(A) (B) (C) (D)	22	(A) (B) (C) (D)	37	(A) (B) (C) (D)	52	(A) (B) (C) (D)
08	(A) (B) (C) (D)	23	(A) (B) (C) (D)	38	(A) (B) (C) (D)	53	(A) (B) (C) (D)
09	(A) (B) (C) (D)	24	(A) (B) (C) (D)	39	(A) (B) (C) (D)	54	(A) (B) (C) (D)
10	(A) (B) (C) (D)	25	(A) (B) (C) (D)	40	(A) (B) (C) (D)	55	(A) (B) (C) (D)
11	(A) (B) (C) (D)	26	(A) (B) (C) (D)	41	(A) (B) (C) (D)	56	(A) (B) (C) (D)
12	(A) (B) (C) (D)	27	(A) (B) (C) (D)	42	(A) (B) (C) (D)	57	(A) (B) (C) (D)
13	(A) (B) (C) (D)	28	(A) (B) (C) (D)	43	(A) (B) (C) (D)	58	(A) (B) (C) (D)
14	(A) (B) (C) (D)	29	(A) (B) (C) (D)	44	(A) (B) (C) (D)	59	(A) (B) (C) (D)
15	(A) (B) (C) (D)	30	(A) (B) (C) (D)	45	(A) (B) (C) (D)	60	(A) (B) (C) (D)