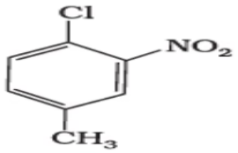
	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	**Department: SCIENCE 2026 – 27** **SUBJECT: CHEMISTRY**	**Date: 03/11/2026**
Worksheet No: 6 **WITH ANSWERS**	**CHAPTER: Organic Chemistry: Some basic principles and techniques**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT:	**CLASS & SEC:**	**ROLL NO.**

Multiple Choice Questions:

1. Which of the following carbocations is the least stable?
   (a) CH_3^+
   (b) $CH_3CH_2^+$
   (c) $(CH_3)_2CH^+$
   (d) $(CH_3)_3C^+$
2. The IUPAC name for $CH_3COCH_2\ CH_2COOH$
   (a) 1-Hydroxypentane-l, 4-dione
   (b) 1,4-Dioxopentanol
   (c) l-Carboxybutan-3-one
   (d) 4-Oxopentanoic acid
3. The geometry around the carbon atom in methanal (HCHO) is:
   (a) Tetrahedral
   (b) Trigonal planar
   (c) Linear
   (d) Trigonal pyramidal
4. Which of the following represents the correct order of decreasing priority?
   (a) Aldehyde > Amine > Ketone
   (b) Ketone > Aldehyde > Amine
   (c) Aldehyde > Ketone >Amine
   (d) Ketone > Amine > Aldehyde
5. Electronegativity of carbon atoms depends upon their state of hybridisation. In which of the following compounds is the carbon marked with an asterisk most electronegative?
   (a)$CH_3–CH_2–*CH_2–CH_3$
   (b)$CH_3–*CH=CH–CH_3$
   (c)$CH_3–CH_2–C–*C-H$
   (d) $CH_3 – CH_2 – CH = *CH_2$
6. The IUPAC name for



(a) 1-Chloro-2-nitro-4-methylbenzene
(b) 1-Chloro-4-methyl-2-nitrobenzene
(c) 2-Chloro-1-nitro-5-methylbenzene
(d) m-Nitro-p-chlorotoluene

7. The fragrance of flowers is due to the presence of some steam volatile organic compounds called essential oils. These are generally insoluble in water at room temperature but are miscible with water vapour in the vapour phase. A suitable method for the extraction of these oils from the flowers is:
   (a) Distillation
   (b) Crystallisation
   (c) Distillation under reduced pressure
   (d) Steam distillation
8. Electrophilic addition reactions proceed in two steps. The first step involves the addition of an electrophile. Name the type of intermediate formed in the first step of the following addition reaction. $H_3C\text{-}HC = CH_2 + H^+ \rightarrow ?$
   (a) 2° Carbanion
   (b) 1° Carbocation
   (c) 2° Carbocation
   (d) 1° Carbanion
9. Which of the following is a nucleophile?
   (a) BF_3
   (b) $AlCl_3$
   (c) NH_3
   (d) H^+
10. 2-Methylbutane and 2,2-dimethylpropane are:
   (a) Position isomers
   (b) Functional isomers
   (c) Chain isomers
   (d) Metamers

Assertion–Reasoning Questions :

11. Assertion (A): Pent- 1- ene and pent- 2- ene are position isomers.
   Reason (R): Position isomers differ in the position of a multiple bond, a functional group or a substituent.
12. Assertion (A): Components of a mixture of red and blue inks can be separated by distributing the components between stationary and mobile phases in paper chromatography.
   Reason (R): The coloured components migrate at different rates because they have different partition coefficients between the stationary phase (water held in the paper) and the mobile phase (solvent).
13. Assertion (A): The energy of the resonance hybrid is equal to the average of the energies of all canonical forms.
   Reason (R): Resonance hybrid cannot be represented by a single structure.
14. Assertion: A carbocation is an electron-rich species.

Reason: A carbocation has an incomplete octet and can accept an electron pair.

Case/Source-Based Questions:

Read the following information and answer questions 15–18.
Inductive effect is the permanent polarisation of sigma bonds caused by an electronegative atom or group. The effect decreases rapidly with increasing distance from the substituent. Electron-withdrawing groups can increase the acidity of nearby carboxylic acids. Resonance involves delocalisation of electrons in a conjugated system.

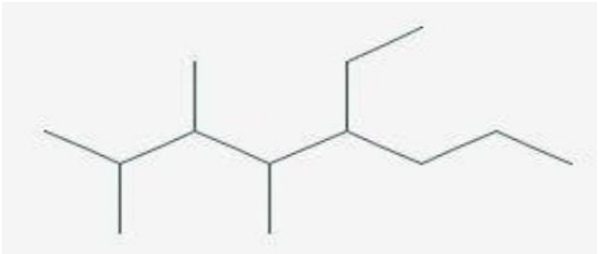
15. What is meant by the inductive effect?
16. Why is chloroacetic acid more acidic than acetic acid?
17. Predict whether trichloroacetic acid is stronger or weaker than chloroacetic acid and give a reason.
18. Does the inductive effect operate through sigma bonds or pi bonds

Very Short Answer Questions :

19. Electromeric effect is a temporary effect. Give reason
20. Alcohols are weaker acids than water. Why?
21. Benzyl carbocation is more stable than ethyl carbocation. Justify.
22. Select electrophiles out of the following:

H^+, Cl^-, $AlCl_3$, CN^-, $CH_3CH_2^+$

23. Give the IUPAC name of the saturated hydrocarbon having the following carbon skeleton.



Short Answer Questions:

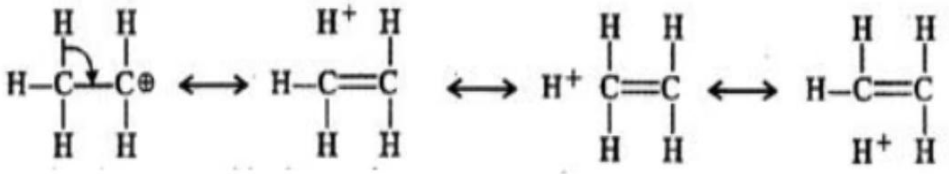
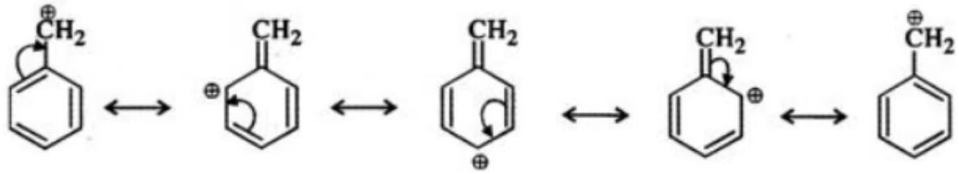
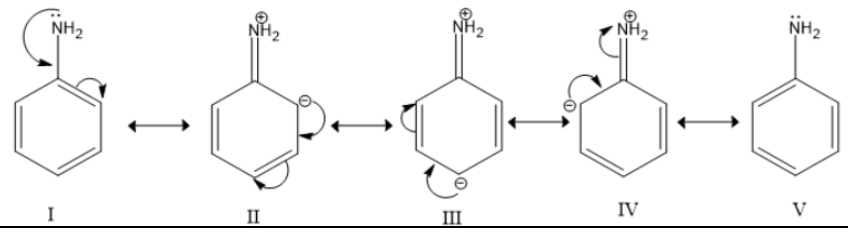
24. Draw the resonance structures of Aniline.
25. Describe the qualitative analysis of Nitrogen and Sulphur.
26. Write the structures of various carbocations that can be obtained from 2-methylbutane. Arrange these carbocations in order of increasing stability**.**

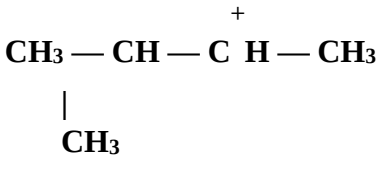
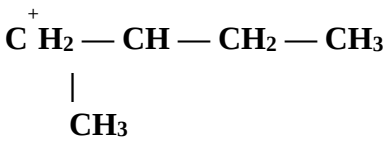
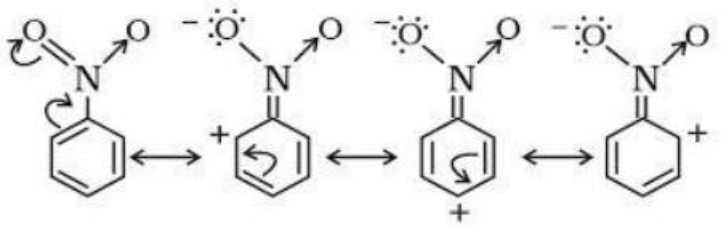
Long Answer Questions:

27. Define hyperconjugation. Explain hyperconjugation in propene with suitable structures.
28. (a) Draw the resonance structures of Nitrobenzene.
    (b)Give three points of difference between inductive effect and resonance effect.
29. What are reaction intermediates? How are they generated by bond fission?
30. (a)Describe the method of column chromatography.

(b) Suggest methods for the separation of the following mixtures. (i) A mixture of liquid A (b.p. 365 K) and liquid B (b.p. 356 K). (ii) A mixture of liquid C (b.p. 353 K) and liquid D (b.p. 413 K).

Q No	Answers
1	(a) CH_3^+ – methyl carbocation is the least stable.
2	(d) 4-Oxopentanoic acid
3	(b) Trigonal planar.
4	(c) Aldehyde > Ketone >Amine
5	(c)$CH_3–CH_2–C–*C\equiv H$ The more s-character, the more electronegative the carbon atom is. Thus, the sp hybridised carbon atom is most electronegative because the contribution of s and p orbitals is 50 %.
6	(b) 1-Chloro-4-methyl-2-nitrobenzene
7	(d) Steam distillation
8	(c) 2° Carbocation
9	(c) NH_3.
10	(c) Chain isomers.
11	(a) Both A and R are correct, but R is the correct explanation of A.
12	(a) Both A and R are correct, but R is the correct explanation of A.
13	(d) Assertion (A) is false, but reason (R) is true.
14	d) Assertion (A) is false, but reason (R) is true.
15	Permanent displacement/polarisation of σ-electrons along a chain due to electronegativity differences
16	Cl exerts a strong –I effect, withdraws electron density and facilitates loss of H^+ from the carboxyl group.
17	Stronger. Three Cl atoms exert a greater electron-withdrawing –I effect than one Cl atom.
18	Through σ bonds.
19	The electromeric effect is noticed in the organic compounds containing multiple bonds, i. e., double bond (> C = C < or > C = O) or triple bond (-C≡N) under the influence of the attacking reagent. The moment the attacking reagent is removed, the pi (π) electron pair comes back to its original position, forming a multiple bond again. Therefore, the electromeric effect is a temporary effect.
20	In alcohol (R→-O-H), the alkyl group has a +I effect. It increases the electron density on the oxygen atom. As a result, the release of H+ ion from alcohol is more difficult than from water, or alcohol is a weaker acid.

21	In ethyl carbocation, there is only hyperconjugation of the three α-hydrogen atoms and as a result, the following contributing structures are feasible.  But benzyl carbocation is more stable due to the presence of resonance and the following resonating structures are possible: 
22	H^+, $AlCl_3$, $CH_3CH_2^+$
23	5-Ethyl-2, 3, 4-trimethyloctane
24.	 I II III IV V
25	Nitrogen Experiment The sodium fusion extract is boiled with iron (II) sulphate and then acidified with conc. H2SO4 **Observation** Prussian blue colour Sulphur Experiment The sodium fusion extract is acidified with acetic acid and lead acetate is added to t. **Observation** A black precipitate
26	**Sol: 2-Methylbutane has four possible carbocations:** **(i)** **CH_3 — CH — CH_2 — C H_2** (+) | **CH_3** **(ii)**

	(iii)  **(iv)**  $\boxed{I < IV < II < III}$ • I – Primary carbocation • IV – Primary carbocation (more stable than I due to the +I effect) • II – Secondary carbocation • III – Tertiary carbocation Stability of carbocations increases in the order 1° < 2° < 3°. Out of I and IV, IV is more stable than I because in IV, the CH_3 group is at the α-carbon and in I, it is at the β-carbon, and the +I effect decreases with distance.
27	Hyperconjugation is delocalisation of σ(C–H) electrons of an alkyl group adjacent to an unsaturated centre or electron-deficient atom. In propene, C–H σ electrons of the methyl group interact with the adjacent C=C system.
28	

(b)	<table><tr><th>Feature</th><th>Inductive Effect</th><th>Resonance Effect</th></tr><tr><td>Electron Displacement</td><td>It involves the partial displacement of σ (sigma) electrons along a saturated carbon chain.</td><td>It involves the complete displacement of π (pi) electrons or lone pairs in a conjugated system.</td></tr><tr><td>Distance Dependence</td><td>It is a distance-dependent effect that diminishes rapidly as the distance from the causing atom increases (negligible after 3 carbons).</td><td>It is independent of distance and transmits fully throughout the length of the conjugated system.</td></tr><tr><td>Charge Separation</td><td>It causes a permanent partial charge separation ($\delta+$ and $\delta-$) without breaking or making new bonds.</td><td>It leads to the formation of complete formal charges (+ and −) across different contributing structures.</td></tr></table>
29	Reaction intermediates are highly reactive, short-lived chemical species formed during a chemical reaction that are quickly consumed. They form through bond fission, which breaks a covalent bond. Homolytic fission breaks a bond evenly, creating a free radical (with one unpaired electron), while heterolytic fission breaks a bond unevenly, forming a carbocation (positively charged) and a carbanion (negatively charged).
30	(a)Column chromatography involves separation of a mixture over a column of adsorbent (stationary phase) packed in a glass tube. The mixture is placed on the top of the adsorbent column packed in a glass tube. An appropriate eluent, which is a liquid, is allowed to flow down the column slowly. Depending upon the degree to which the compounds are adsorbed, complete separation takes place. The most readily adsorbed substances are retained near the top, and others come down to various distances in the column. (b) (i) Fractional distillation because the boiling points of the two liquids differ by just 9∘. (ii) Simple distillation since the boiling points of the two liquids are widely apart.

Prepared by: *Ms Shyni Vinod*	*Checked by:* *HOD science*