CHEMISTRY

CLASS XI

COMPETENCY BASED EXAM – DECEMBER 2025

Purification & Estimation

Q1. The method used for separation of volatile liquids from non-volatile impurities is:
A. Sublimation
B. Distillation
C. Crystallization
D. Chromatography

Answer: B. Distillation
Reasoning: Distillation separates volatile components from non-volatile impurities.

Q2. The principle of chromatography is based on:
A. Difference in boiling points
B. Difference in adsorption tendencies
C. Difference in solubility
D. Difference in densities

Answer: B
Reasoning: Chromatography separates substances based on differential adsorption on stationary phase.

Q3. Assertion–Reason

Assertion (A): Kjeldahl's method is not applicable for estimation of nitrogen in nitro compounds.
Reason (R): In Kjeldahl's method, nitrogen must be converted to ammonium salts, which is not possible in nitro compounds.

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, R is false
D. A is false, R is true

Answer: A

Q4. The purity of organic compounds is best checked by:
A. Melting point determination
B. Distillation
C. Filtration
D. Extraction

Answer: A
Reasoning: Pure compounds have sharp melting points; impurities broaden the range.

Q5. The estimation of halogens in organic compounds is done by:
A. Kjeldahl's method
B. Carius method
C. Dumas method
D. Liebig's method

Answer: B. Carius method
Reasoning: Carius method involves oxidation of halogens to silver halides, which are weighed.

General Organic Chemistry (GOC)

Q6. The most stable carbocation among the following is:
A. CH_3^+
B. $CH_3CH_2^+$
C. $(CH_3)_2CH^+$
D. $(CH_3)_3C^+$

Answer: D. $(CH_3)_3C^+$
Reasoning: Tertiary carbocation is stabilized by hyperconjugation and inductive effect.

Q7. The order of stability of carbanions is:
A. $3^0 > 2^0 > 1^0 > CH_3^-$
B. $CH_3^- > 1^0 > 2^0 > 3^0$
C. $1^0 > 2^0 > 3^0 > CH_3^-$
D. $2^0 > 1^0 > 3^0 > CH_3^-$

Answer: B
Reasoning: Carbanions are destabilized by alkyl groups due to +I effect; methyl carbanion is most stable.

Q8. Assertion–Reason
Assertion (A): Resonance increases stability of organic molecules.
Reason (R): Resonance delocalizes electrons, lowering potential energy of the molecule.

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, R is false
D. A is false, R is true

Answer: A

Q9. The hybridization of carbon in carbocation (CH_3^+) is:
A. sp^3
B. sp^2
C. sp
D. None

Answer: B. sp^2
Reasoning: Carbocation has 3 bond pairs and 0 lone pairs ⟶ trigonal planar ⟶ sp^2.

Q10. Assertion–Reason
Assertion (A): Hyperconjugation is also called "no bond resonance."
Reason (R): It involves delocalization of σ-electrons of C–H bond adjacent to carbocation center.

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, R is false
D. A is false, R is true

Answer: A