

A1. The valency of carbon is 4 (Tetravalent).

A2. Covalent compounds are formed by the sharing of electrons and do not contain any free ions or electrons to conduct an electric current.

A3. Graphite.

A4. Silicon atoms have a larger atomic radius than carbon atoms. This makes the Si-Si bonds much weaker and less stable compared to the strong, compact C-C bonds.

A5. C_nH_{2n+2}

A6. As the molecular mass of consecutive members increases, the surface area increases. This leads to stronger intermolecular Van der Waals forces, requiring more thermal energy to break.

A7. C_4H_6 (Butyne). [Note: The first member of the alkyne series is ethyne (C_2H_2)].

A8. No, they do not belong to the same series. C_3H_8 follows the general formula of alkanes (C_nH_{2n+2}), whereas C_4H_8 follows the general formula of alkenes (C_nH_{2n}).

A9. "-al"

A10. Butanoic acid. (The terminal carbon of propane is replaced by the -COOH group, making it a continuous 4-carbon chain where the functional carbon is numbered 1).

A11. Ketone group ($>C=O$).

A12. IUPAC rules state that a methyl branch cannot be placed on a terminal or second-to-last carbon if it simply extends the longest continuous chain. Adding a methyl to the second carbon of ethane creates a straight 3-carbon chain, making its correct name Propane.

A13. Carbon dioxide gas (CO_2).

A14. Alkaline $KMnO_4$ acts as an oxidizing agent. It gets consumed in the reaction as it supplies oxygen to oxidize ethanol into ethanoic acid, which causes its purple color to discharge.

A15. Presence of sunlight (or Ultraviolet/UV light).

A16. Saturated hydrocarbons have a lower percentage of carbon and undergo complete combustion. Unsaturated hydrocarbons have a higher carbon-to-hydrogen ratio, leading to incomplete combustion and unburnt carbon particles (soot).

A17. Saponification.

A18. Water is a polar molecule and cannot bond with non-polar grease. Soap molecules bridge this gap because their hydrophobic hydrocarbon tails dissolve into the grease, while their hydrophilic ionic heads dissolve into the water.

A19. Sodium salt of a long-chain benzene sulfonic acid (or alkyl hydrogen sulfate).

A20. Hard water contains calcium (Ca^{2+}) and magnesium (Mg^{2+}) ions. These ions react with the soluble sodium salts of soap to displace sodium, creating insoluble calcium or magnesium salts of fatty acids (scum).