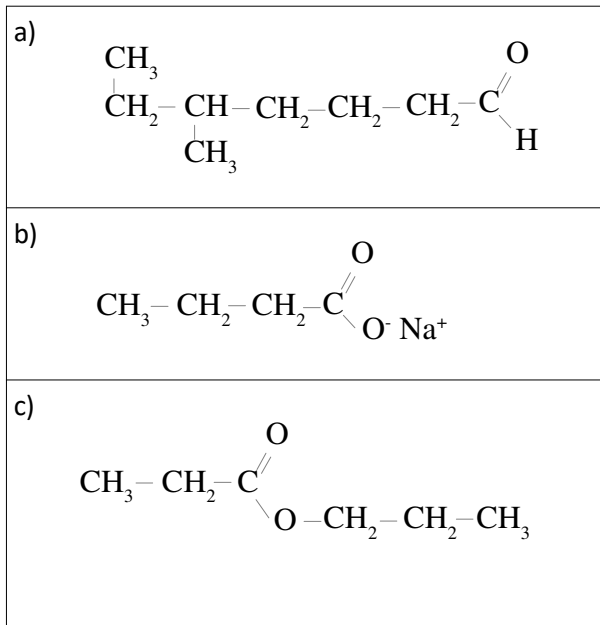


1. Draw structural formula diagrams for the following compounds:

2-methyl propane-1,2-diol	2,3-dichloro butane
3-ethyl hexan-2-one	glycerol (propane-1,2,3-triol)
methanal	2,3-dibromo pent-2-ene
2-iodo hexandioic acid	2-methyl hept-3-yne
ethanamine	sodium propanoate

2. Write names for each of the following :



3. Explain how could you distinguish between a sample of hexane and a sample of decane. /2
4. A carboxylic acid and its isomeric ester tend to both be clear liquids at room temperature.
- (a) State what is meant by the term 'isomer'. /1
- (b) State and explain the property that would allow a carboxylic acid to be distinguished from its isomeric ester in a school laboratory. /3
5. Ethanoic acid has a boiling point of 118°C and propan-1-ol has a boiling point of 97°C, although they have similar molecular weights. Explain this difference in properties. /3
6. Three clear liquids are known to be different alcohols – ethanol, 2-methylbutan-2-ol and butan-2-ol, but the labels have been confused. Suggest a practical method for distinguishing between the alcohols by chemical means. Write appropriate equations for any reactions that occur. /6
7. Assume the density of propan-2-ol is 0.68 g/ml. If 10.0 ml of 2-propanol is oxidized using acidified dichromate solution,
- (a) Write balanced half equations for the reaction /3
- (b) Hence write a balanced equation for the reaction /1
- (c) Show that the expected mass of organic product is 6.6g. /4
- (d) If a student carried out this experiment and obtained 4.7g of organic product, calculate the percentage yield of the experiment. /1

8. Consider the simple sugar, glucose.
- Draw its structure in both cyclic and open chain forms (you don't need to memorise these) /2
 - Explain with the aid of a diagram why glucose is soluble in water. /3
 - State the structural feature of glucose which allows it to react with Tollens' reagent. /1
 - Draw the structure of the organic product formed from the reaction of glucose with Tollens' reagent. /2
 - State what would be observed if a saturated glucose solution was heated with a small amount of acidified dichromate solution. Explain these observations with the aid of an equation. /3
9. State the products of the following reactions:
- Hex-1-ene and hydrogen gas /1
 - Propanal and Tollen's reagent /2
 - Octane and oxygen /2
 - Hexan-1-ol and acidified dichromate solution /2
10. You are given a foul smelling mixture of the liquids heptanoic acid and heptan-1-ol, both of which are insoluble in water. Describe and explain how they can be separated.
11. Write annotated (includes conditions) equations for the reaction between the following pairs of chemicals.
- Ethyl pentanoate and sodium hydroxide solution /3
 - Ethanoic acid and propan-1-ol /3
 - N*-methylhexan-2-amine and dilute hydrochloric acid /3
- 12.
- Draw the structural formula of the oil (or fat) formed from these carboxylic acids:
 - lauric acid $\text{CH}_3(\text{CH}_2)_{10}\text{COOH}$
 - oleic acid $\text{CH}_3(\text{CH}_2)_7\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$
 - stearic acid $\text{CH}_3(\text{CH}_2)_{16}\text{COOH}$ /2
 - Give the systematic name for the alcohol from which triglycerides are formed. /1
 - Identify the most likely source of an edible triglyceride if it is solid at 25°C. /1
 - Describe and explain the use of a solution of bromine or iodine to determine the degree of unsaturation of a compound. /3
 - The oil or fat formed in part (a) is reacted with bromine. Draw the structural formula of the reaction product. /1
 - Explain the role of pressure, temperature, and a catalyst in the hydrogenation of liquid triglycerides. /3
13. Consider the imaginary amino acid, fictine. Its properties are yours to determine.
- Invent a possible structural formula of fictine. /2
 - Draw the structural formula of the product formed when fictine self-ionises. /1
 - A sample of fictine is mixed with another amino acid, fakine. A condensation reaction occurs and long chains are formed.
Draw a section of one of these chains (you'll have to invent fakine too). /2
 - Circle a peptide link on your answer to part (c). /1
 - Name the functional group that a peptide link consists of. /1
 - On the diagram drawn for (c), show how the chain can interact with water. /2
 - Name the interaction shown in part (f). /1
 - Write (draw) the general formula of amino acids. /2
- 14.
- Explain why the biological function of a protein (e.g. an enzyme) is altered if its spatial arrangement is altered. /2
 - Explain why proteins are sensitive to changes in pH. /2
 - Explain why proteins are sensitive to changes in temperature. /2