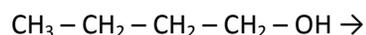


Organic Reactions Worksheet

1. Elimination reactions of alcohols are generally slow, and require an acid catalyst and heating.
 - (a) Draw structural diagrams to represent the elimination reaction of water from 1 - propanol.
 - (b) Write a word equation, with IUPAC names, for the dehydration reaction (in the presence of concentrated H_2SO_4)



2. Only a few of the simpler alcohols are used in combustion reactions. Alcohol-gasoline mixtures, known as gasohol, are the most common examples. Write a balanced chemical equation, using molecular formulas, for the complete combustion of the following alcohols:

- (a) ethanol (in gasohol)
- (b) 2-propanol (rubbing alcohol)

3. Classify and write structural formula equations for the following organic reactions.

- (a) ethene + water \rightarrow ethanol
- (b) 2 - butanol \rightarrow 1 - butene + 2 - butene + water
- (c) ethoxyethane + oxygen \rightarrow
- (d) ethene + hypochlorous acid ($\text{HOCl}_{(aq)}$) \rightarrow 2 - chloroethanol
- (e) methanol + oxygen \rightarrow

4. The major disadvantages of using ethoxyethane as an anesthetic are its irritating effects on the respiratory system and the occurrence of post-anesthetic nausea and vomiting. For this reason, it has been largely replaced by methoxypropane, which is relatively free of side effects.

- (a) Draw structural formulas of ethoxyethane and methoxypropane, and determine if they are isomers.
- (b) Write an equation to show the formation of ethoxyethane from ethanol.

5. Draw structural diagrams and write IUPAC names for the product(s) formed when 1-propanol undergoes the following reactions:

- (a) controlled oxidation with $\text{Na}_2\text{Cr}_2\text{O}_7$
- (b) complete combustion

6. Suppose that you are given three alcohols: a primary alcohol, a secondary alcohol, and a tertiary alcohol. Design an experimental procedure that you could carry out with commonly available materials and equipment that would identify the tertiary alcohol. Describe the main steps in the procedure and explain your experimental design.

7. Design an experimental procedure for the synthesis of butanone from an alkene. Identify the starting alkene of your choice, describe the steps in the procedure, and include the experimental conditions needed. Your answer should also contain any precautions required in the handling and disposal of the materials.

8. Write a series of chemical equations to illustrate the synthesis of a carboxylic acid from the controlled oxidation of 1-propanol.

9. When a bottle of wine is left open to the air for a period of time, the wine often loses its alcoholic content and starts to taste sour. Write a series of equations to illustrate the reactions.

10. Write complete structural diagram equations and word equations for the formation of the following esters.
- ethyl methanoate
 - ethyl benzoate
 - methyl butanoate
 - 3-methylbutyl ethanoate
11. Draw structural diagrams for each of the following compounds:
- methanoic acid
 - the product of controlled oxidation of propanal
 - the acid formed from saponification of butyl ethanoate
 - the ester that is produced in the esterification of 1-propanol and formic acid
 - the ester that is produced in the esterification of phenol and vinegar
12. Draw the structures of the compounds formed by condensation reactions between the following reactants, and write IUPAC names for each product.
- formic acid and 2-butanol
 - acetic acid and 1-propanol
 - benzoic acid and methanol
13. Explain why the formation of an amide from a carboxylic acid and an amine is a condensation reaction
14. Write a series of equations to represent the formation of *N*-methyl ethanamide from methane, ethanol, and inorganic compounds of your choice. Write an equation to represent the formation of an amide linkage between propanoic acid and diethylamine.
15. In this chapter, you have encountered many different chemical names for a range of chemical families.
- Summarize all the families, functional groups, and naming convention(s) in a chart.
 - Comment on whether you feel that this is a logical naming system, and suggest any improvements that would, in your opinion, make the system simpler to use.
16. For each product, write a structural formula and an equation or a series of equations for a method of synthesis from other compounds.
- pentyl ethanoate from ethene and an alcohol
 - phenyl ethanoate from an alkene and an alcohol
 - 3-octanone from a simpler compound
 - methyl benzoate from two alcohols
 - sodium salt of butanoic acid from an ester
 - trimethylamine from ammonia and alkanes
 - N*-ethylethanamide from an alkane and ammonia
17. In artificial apple flavour, the main ingredient is ethyl 2-methylbutanoate.
- Draw a flow chart to show the synthesis of this compound, starting with simpler compounds.
 - Describe the steps in the procedure for this synthesis. Include experimental conditions and safety precautions in the handling and disposal of materials.