

# Alkene reactions

Answer all the questions below then check your answers

1. Alkenes are unsaturated, what does this mean?
2. Name the first 4 alkenes
3. True or false:
  - a. Alkenes are saturated hydrocarbons.
  - b. The addition of bromine water to an alkene results in a colour change from orange to colourless.
  - c. Hydrogenation of vegetable oils increases their melting point.
4. Fill in the gaps to complete the sentences below:

The process of adding hydrogen to an unsaturated molecule is called \_\_\_\_\_.

The reaction of an alkene with water to form an alcohol is called \_\_\_\_\_.

When bromine reacts with an alkene, the type of reaction is called \_\_\_\_\_.

5. Match the alkene reaction with its product:

Hydrogenation

A. Dihaloalkane

Hydration

B. Alcohol

Halogenation

C. Alkane

6. What is the general formula for alkenes?

b. Describe the process of hydrogenation of vegetable oils and explain its purpose in the food industry.

7. Which of the following is NOT a reaction of alkenes?

a) Combustion

b) Substitution

c) Addition

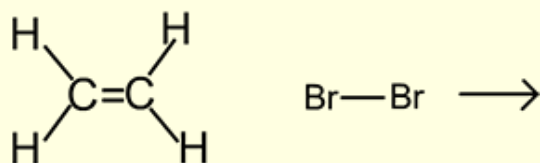
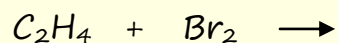
d) Polymerization

8. Describe the test for unsaturation in a molecule. Give the result of the test.

9. Other than combustion what type of reactions do alkenes readily undergo?

10. Ethene reacts with bromine to form 1,2-dibromethane. Complete the equations below.

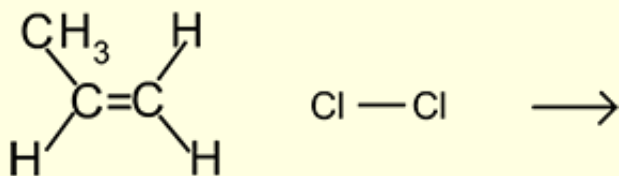
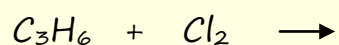
a. ethene + bromine  $\rightarrow$



b. Explain and describe what happens to the ethene molecule in the equations above.

11. Propene reacts with chlorine to form 1,2-dichloropropane. Complete the equations below to show this addition reaction.

a. propene + chlorine  $\rightarrow$



12. Explain why alkanes do not undergo addition reactions.

## Answers

1. Alkenes are unsaturated, what does this mean? They contain a C=C

2. Name the first 4 alkenes

ethene, propene, butene, pentene

3. True or false:

a. Alkenes are saturated hydrocarbons.

False they are unsaturated hydrocarbons.

b. The addition of bromine water to an alkene results in a colour change from orange to colourless.

True, an alkene when shaken with bromine water will decolourise orange brown bromine water to form a colourless or clear solution.

c. Hydrogenation of vegetable oils increases their melting point.

True, hydrogenation of vegetable oils will harden or saturate a vegetable oil and raise its melting point.

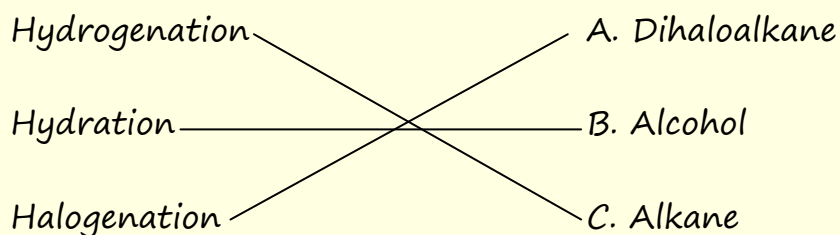
4. Fill in the gaps to complete the sentences below:

The process of adding hydrogen to an unsaturated molecule is called hydrogenation.

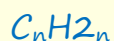
The reaction of an alkene with water to form an alcohol is called hydration.

When bromine reacts with an alkene, the type of reaction is called addition.

5. Match the alkene reaction with its product:



6. What is the general formula for alkenes?



b. Describe the process of hydrogenation of vegetable oils and explain its purpose in the food industry.

Hydrogen gas is added to vegetable oils under pressure and in the presence of a nickel catalyst. This process converts unsaturated oils into saturated fats, raising their melting point and making them solid at room temperature. This is done to improve texture and shelf life in food products like margarine.

7. Multiple Choice (1 mark each)

Which of the following is NOT a reaction of alkenes?

- a) Combustion
- b) Substitution – undergone by alkanes not alkenes
- c) Addition
- d) Polymerization

8. Describe the test for unsaturation in a molecule. Give the result of the test.

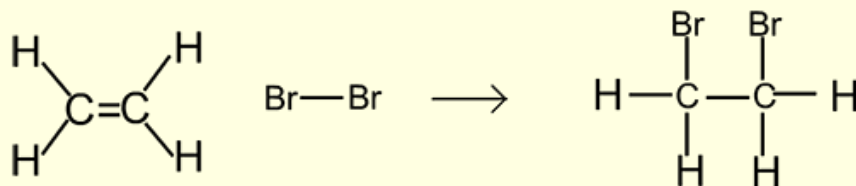
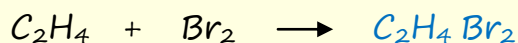
Add orange-brown bromine water to the alkene in a boiling tube, shake quickly to mix the two reactants, if there is any  $C=C$  present in the test substance then the bromine water will decolourise immediately

9. Other than combustion what type of reactions do alkenes readily undergo?

Addition reactions. A small molecule such as  $Cl_2$ ,  $Br_2$  or  $H_2O$  will add across the  $C=C$  in an alkene or unsaturated molecule.

10. Ethene reacts with bromine to form 1,2-dibromethane. Complete the equations below.

a. ethene + bromine  $\rightarrow$  1,2-dibromoethane

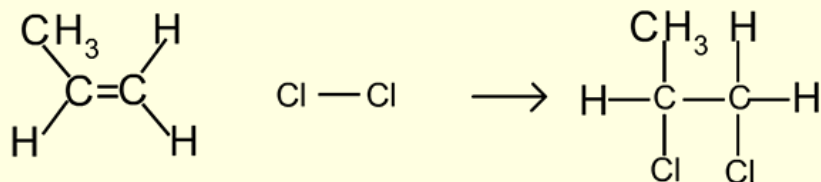


b. Explain what happens to the ethene molecule in the equations above.

The double bond between the carbon atoms breaks to form a single bond and each of the carbon atoms in the double bond has an atom of bromine added to it.

11. Propene reacts with chlorine to form 1,2-dichloropropane. Complete the equations below to show this addition reaction.

a. propene + chlorine  $\longrightarrow$  1,2-dichloropropane



12. Explain why alkanes do not undergo addition reactions.

In order to have addition reactions you need an unsaturated molecule with a  $\text{C}=\text{C}$ , alkanes are saturated and contain only  $\text{C}-\text{C}$ , only single bonds present between the atoms of carbon. So no addition reactions are possible. Alkanes undergo substitution reactions.