

Answer all the questions below then check your answers

1 What is the main use for alkanes?

b. Which elements are found in alkanes?

2 Name three fossil fuels.

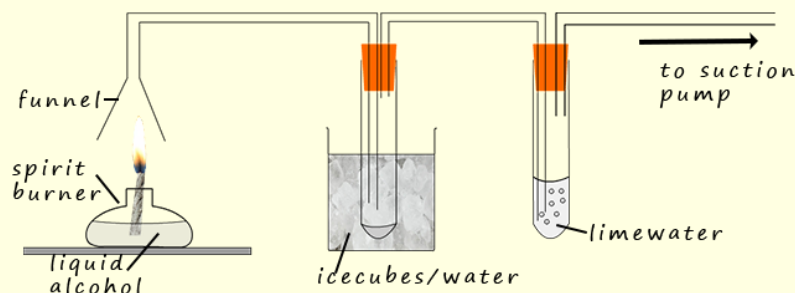
a. What elements are found in most fossil fuels?

b. What gas is needed for burning or combustion?

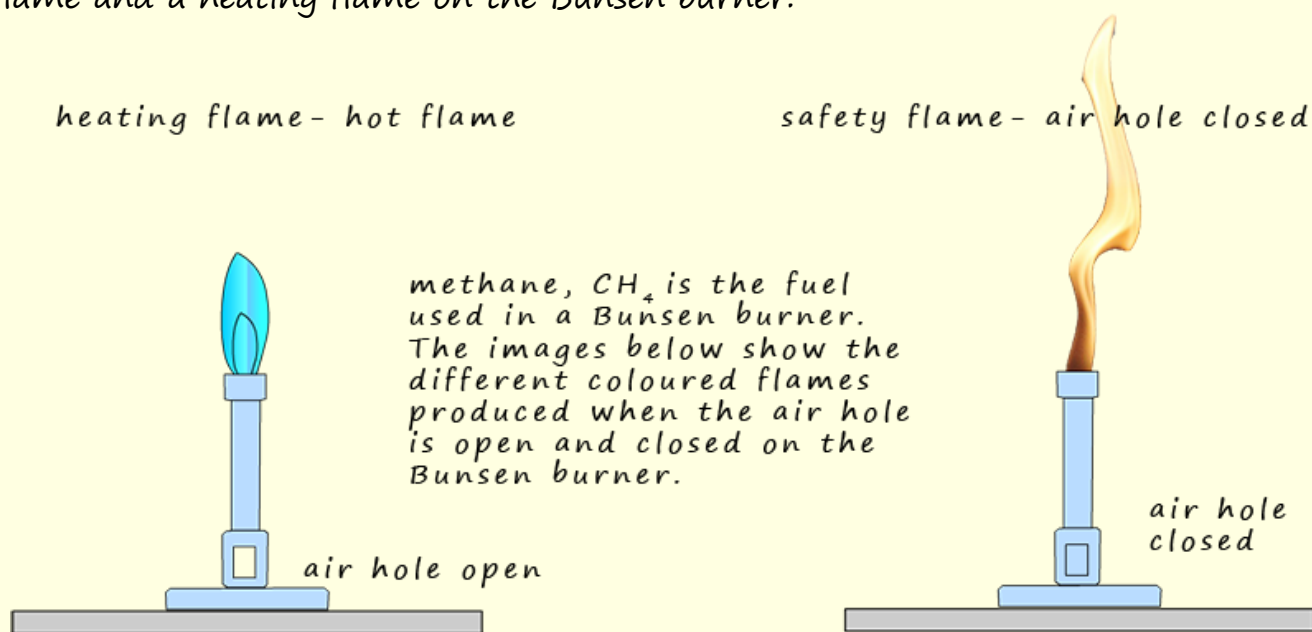
3 What gas turns limewater milky?

a. What test can be used to identify a substance as water?

4 Study the picture below. It shows a spirit burner containing alcohol burning, the gases produced by the flame are "sucked" through both boiling tubes.



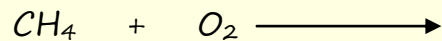
- a. The first boiling tube is kept cold by the iced/water bath. What will collect in this boiling tube?
- b. The second boiling tube contains limewater. What do you think will happen in this boiling tube? Give a reason for your answer
- c. If you suspected that the alcohol might contain sulphur how would you change the set-up above to test for sulphur?
5. Methane, CH_4 , is the gas used in Bunsen burners. The image below shows a safety flame and a heating flame on the Bunsen burner.



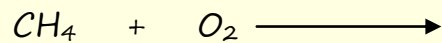
- a. What is the difference between complete and incomplete combustion?
- b. Complete the word equation to show the complete combustion of methane:



c. Complete the symbolic equation to show the incomplete combustion of methane produce carbon monoxide and water vapour:

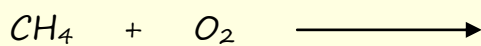
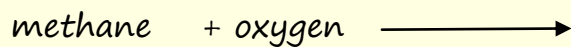


d. Complete the symbolic equation to show the incomplete combustion of methane to produce carbon and water vapour:



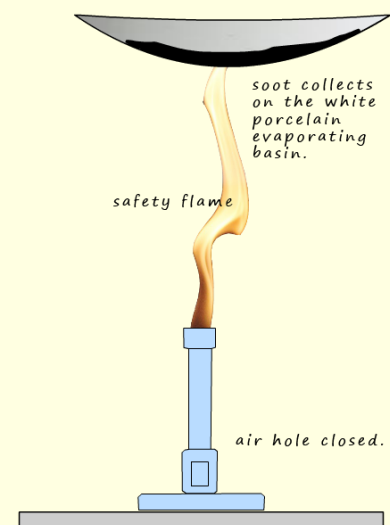
e. Which type of combustion releases the most energy? Complete or incomplete?

f. If the amount of oxygen for combustion is very low the soot (carbon) is produced as one of the products of incomplete combustion. Complete the word and symbolic equations for the incomplete combustion of methane to form soot and water vapour.



g. Why does methane burn with incomplete combustion when the air hole is closed yet when it is open it burns with complete combustion?

h. Name two problems associated with incomplete combustion.



Answers

1 What is the main use for alkanes? *Fuels*

b. Which elements are found in alkanes? *Carbon and hydrogen*

2 Name three fossil fuels. *Coal, oil, gas*

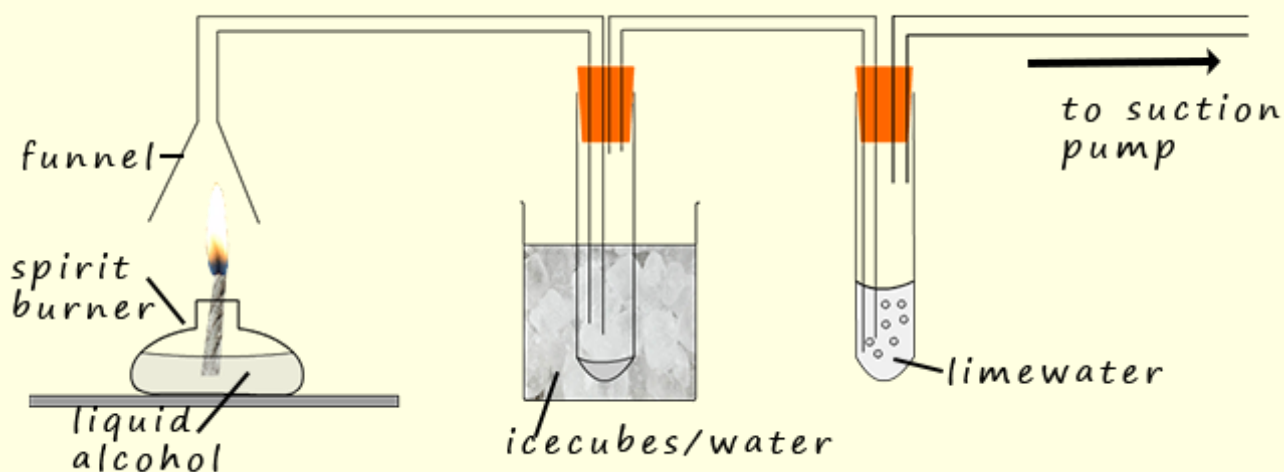
a. What elements are found in most fossil fuels? *Carbon, hydrogen and sulfur*

b. What gas is needed for burning or combustion? *oxygen*

3 What gas turns limewater milky? *Carbon dioxide*

a. What test can be used to identify a substance as water? *Blue cobalt chloride paper turns pink*

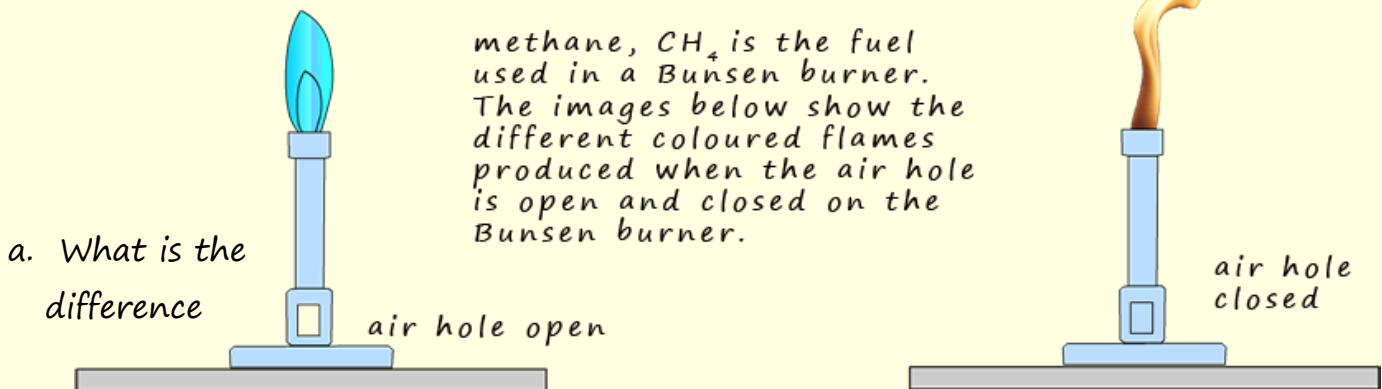
4 Study the picture below. It shows a spirit burner containing alcohol burning, the gases produced by the flame are “sucked” through both boiling tubes.



- a. The first boiling tube is kept cold by the iced/water bath. What will collect in this boiling tube? *Steam from the flame will condense and water will collect*
- b. The second boiling tube contains limewater. What do you think will happen in this boiling tube? Give a reason for your answer. *It will turn milky/chalky due to the presence of carbon dioxide from the burning alcohol.*
- c. If you suspected that the alcohol might contain sulphur how would you change the set-up above to test for sulphur? *Add a third boiling tube filled with universal indicator, if sulfur is present in fuel then sulfur dioxide will be produced. This is an acidic gas and the universal indicator will turn red.*
5. Methane, CH_4 , is the gas used in Bunsen burners. The image below shows a safety flame and a heating flame on the Bunsen burner.

heating flame - hot flame

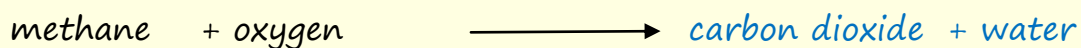
safety flame - air hole closed



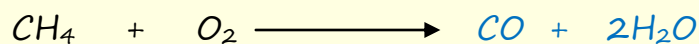
- a. What is the difference

between complete and incomplete combustion? *Incomplete combustion is combustion where there is a reduced amount of oxygen present. The products are flammable (soot and carbon monoxide) indicating that there is not enough oxygen present.*

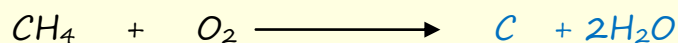
b. Complete the word equation to show the complete combustion of methane:



c. Complete the symbolic equation to show the incomplete combustion of methane to produce carbon monoxide and water vapour:

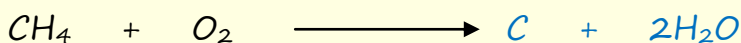
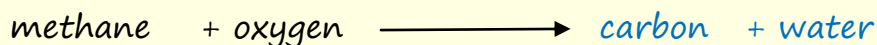


d. Complete the symbolic equation to show the incomplete combustion of methane to produce carbon and water vapour :

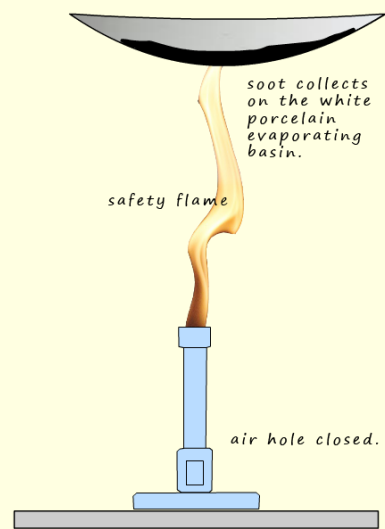


e. Which type of combustion releases the most energy? Complete or incomplete?
complete

f. If the amount of oxygen for combustion is very low the soot (carbon) is produced as one of the products of incomplete combustion. Complete the word and symbolic equations for the incomplete combustion of methane to form soot and water vapour.



g. Why does methane burn with incomplete combustion when the air hole is closed yet when it is open it burns with complete combustion? When the air hole is open air (oxygen) is sucked into the Bunsen chimney as the methane rises up it. This means the two gases are well mixed by the time they come out the top of the Bunsen chimney. So when they are ignited



they burn well as the methane and oxygen are completely mixed. With the air hole closed the methane in contact with the air when it leaves the chimney is the only part of the flame where combustion happens. If an unlit match is pushed inside a safety flame, it will not burn. Simply because there is no oxygen present.

h. Name two problems associated with incomplete combustion.

Carbon monoxide is a toxic gas. Soot is a particulate; these can cause serious breathing problems in people. Soot can also block pipes and ducts inside boilers/engines and cause damage.