

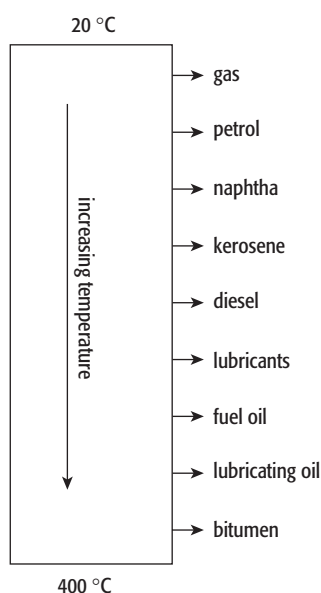
Worksheet 11.1

Distillation of petroleum and cracking

1 Distilling petroleum

Many useful chemicals can be obtained from petroleum (crude oil). The first stage to obtaining these fractions and compounds is fractional distillation of the petroleum.

In the petrochemical industry



- ◆ Petroleum is vaporised and fed into the bottom of the fractionating column.
- ◆ As the vapour rises, different fractions condense at different levels.
- ◆ The different fractions are run off down separate pipes.
- ◆ Gases, which do not condense, are led off at the top.
- ◆ Bitumen, which leaves at the bottom of the tower, is the part of the petroleum that does not vaporise.

a Why do the gases not condense?

.....

b Why do the fractions condense at different levels?

.....

c Which fraction has the higher boiling point, petrol or naphtha?

.....

d Why does the bitumen not vaporise?

.....

e Complete the table by giving **one** use for each of the following fractions.

Fraction	Use
petrol (gasoline)	
naphtha	
kerosene (paraffin)	
lubricating oil	
bitumen	

In the laboratory

- ◆ The petroleum is heated and the fractions boil off one by one.
- ◆ The temperature of the vapour is measured with a thermometer.
- ◆ The vapour is then cooled and collected as a liquid fraction.
- ◆ The collecting test tube is changed at intervals according to the temperature.
- ◆ In an experiment, the tube was changed every 60 °C.
- ◆ The thermometer can only read temperatures up to 360 °C.

f Using the information in the box above, draw a diagram of the apparatus used.

g Why is this method used in the laboratory?

.....

h Why is the first method much better for use in industry?

.....

i Why do we not collect any lubricating oil when using the laboratory method?

.....

j Which fraction do you think will burn most easily?

.....

2 Complete these sentences by choosing the correct word from each pair.

The hydrocarbons in petroleum are called **alkanes** / **alkenes**. Their carbon atoms are joined by **single** / **double** bonds. They cannot form any extra bonds so they are said to be **saturated** / **unsaturated**. When long-chain hydrocarbons from petroleum are cracked, **alkanes** / **alkenes** such as ethene are formed. Ethene has a carbon-carbon **single** / **double** bond. This can open up to add more atoms, so ethene is said to be **saturated** / **unsaturated**.