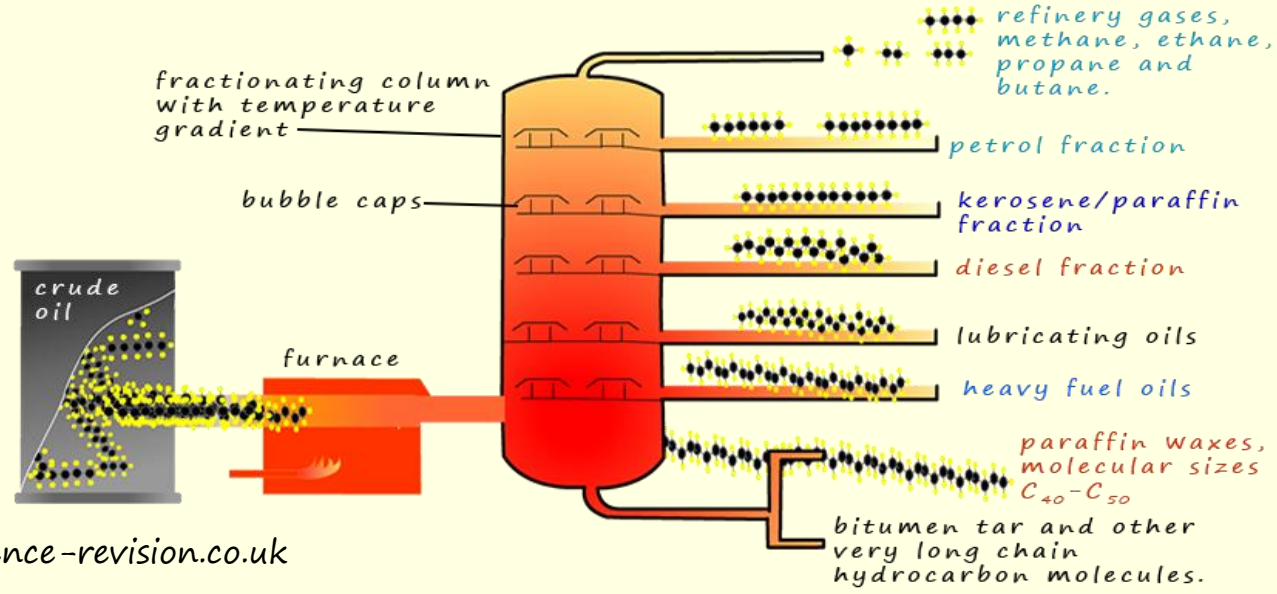
Answer all the questions then check your answers

1. What is the change from a gas to a liquid called?
2. What is crude oil a mixture of?
3. What is the connection between molecular size and boiling point of hydrocarbon molecules?
4. The diagram below outlines how crude oil is refined at the oil refinery. Explain what the diagram shows and use the words in the table below to describe how the crude oil is separated out into its various parts or fractions:

Mixture of hydrocarbons	Fractionating column
Temperature gradient	condense
fractions	



5. What can you say about the following properties of the fractions obtained from the distillation of crude oil:

i Which fractions are the most flammable? Those near the top of the fractionating column or those close to the bottom?

ii Which fractions are the most viscous? Those near the top of the fractionating column or those close to the bottom?

iii Which fractions burn with the cleanest flame? Those near the top of the fractionating column or those in the middle?

Iv Which fractions have the highest boiling points? Those near the top of the fractionating column or those close to the bottom?

Answers

1. What is the change from a gas to a liquid called? condensation
2. What is crude oil a mixture of ? hydrocarbons
3. What is the connection between molecular size and boiling point of hydrocarbon molecules? Small molecules have low boiling points, large molecules have high boiling points
4. The diagram below outlines how crude oil is refined at the oil refinery. Explain what the diagram shows and use the words in the table below to describe how the crude oil is separated out into its various parts or fractions:

Mixture of hydrocarbons	Fractionating column
Temperature gradient	condense
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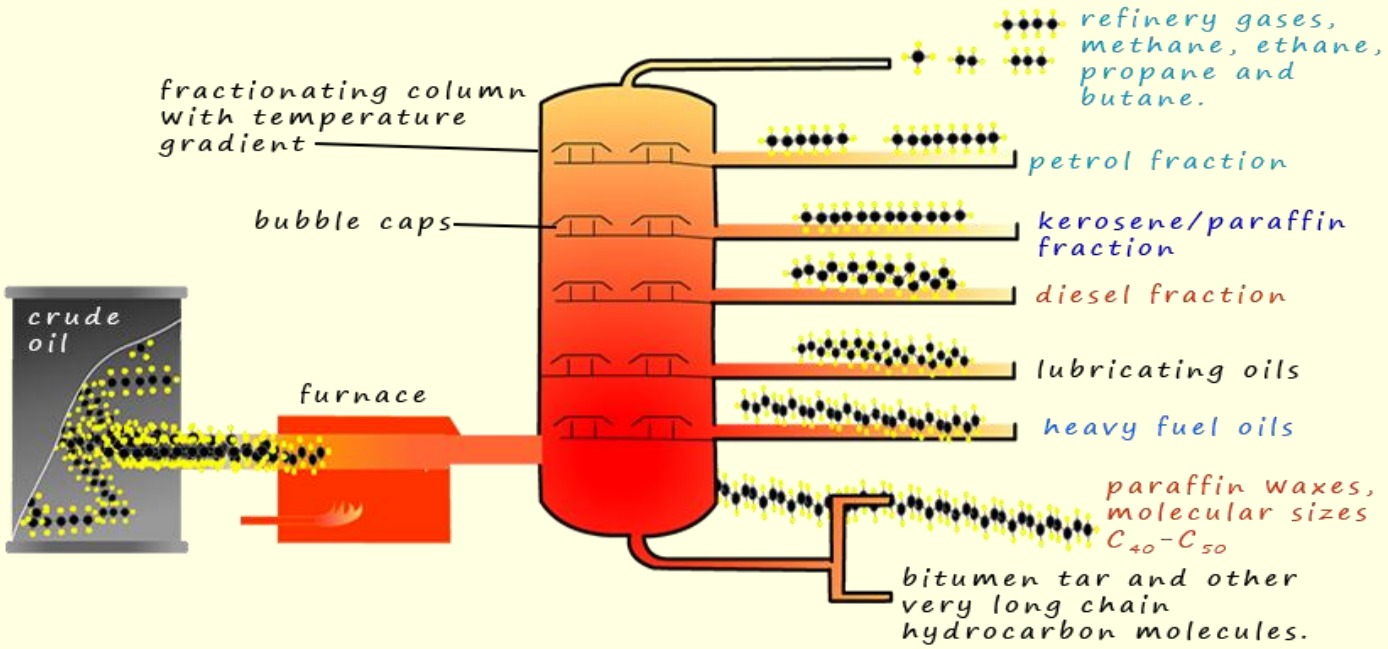

Crude oil is a mixture of hydrocarbon molecules. This mixture of hydrocarbons is separated out in a tall fractionating column. The crude oil is heated in a hot pipe inside a furnace, most of the fractions in the oil are vapourised. The hot vapours then enter the base of the fractionating column. The hot vapours begin to rise up the column and quickly come into contact with the bubble caps. The fractionating column has a temperature gradient, it is hot at the bottom and gets cooler as you rise up through the column. When the hot hydrocarbon vapours hit a bubble cap cooler than their boiling points they condense and turn back into a liquid. This liquid or fraction contains a mixture of hydrocarbon molecules of similar size and similar boiling points. Any vapours which do not condense are removed at the top of the fractionating column. Large hydrocarbon molecule which are not vapourised in the furnace are collected at the base of the fractionating column.

5. What can you say about the following properties of the fractions obtained from the distillation of crude oil:

i Which fractions are the most flammable? Those near the top of the fractionating column or those close to the bottom? Small molecules are the most flammable, these molecules are at the top of the column.

ii Which fractions are the most viscous? Those near the top of the fractionating column or those close to the bottom? Large molecule are more viscous than small molecules, so the most viscous molecules are at the bottom of the column.

iii Which fractions burn with the cleanest flame? Those near the top of the fractionating column or those in the middle? Small molecules burn with clean flames, so cleanest burning hydrocarbon fuels will those at the top of the column.

Iv Which fractions have the highest boiling points? Those near the top of the fractionating column or those close to the bottom? Bottom, large molecules have high boiling points.