Section 1.4: Crude Oil and Fuels

Fractional Distillation of Crude Oil

- That crude oil is a mixture of many different compounds, most of which are hydrocarbons (compounds made from only hydrogen and carbon).
- That the substances in a mixture are not chemically bonded to each other.
- That the substances in a mixture keep all of their original properties (e.g. boiling point) and so can be separated from each other using physical methods (e.g. distillation).
- How crude oil can be separated into fractions using fractional distillation.

Properties and Uses of Crude Oil

- That most of the compounds in crude oil are a type of hydrocarbon known as alkanes and how to recognise alkanes from either their chemical formula or their displayed structure.
- The chemical formulae and displayed structures of methane, ethane, propane and butane.
- That alkanes have the general formula C_nH_{2n+2} and are described as saturated hydrocarbons because all of the atoms in an alkane have formed bonds with as many other atoms as they possibly can.
- That the shorter the molecules the less viscous a hydrocarbon is, the more volatile a hydrocarbon is and the more flammable a hydrocarbon is.
- Why alkanes with different properties are used in different ways.

Environmental Problems

- That most fuels (including the fossil fuels coal, oil and natural gas) contain carbon and hydrogen.
- That when fuels are burnt, the carbon is oxidised to carbon dioxide, the hydrogen is oxidised to water and energy is released.
- That carbon monoxide, carbon particulates and unburnt fuel can be released if there is not enough oxygen available when a fuel burns (this is called partial combustion).
- How to write balanced symbol equations for the complete and partial combustion of fuels.
- That sulfur dioxide can be released when a fuel burns if the fuel contains sulfur impurities and oxides of nitrogen can be released if the fuel burns at a high temperature.
- That sulfur dioxide and nitrogen oxides can cause acid rain if they mix with the water in clouds.
- That acid rain can be reduced by removing sulfur from fuels before they are burnt, or by removing sulfur dioxide from waste gases before they are released.
- That carbon dioxide contributes to global warming (a type of climate change) and that carbon particulates in the atmosphere may have caused global dimming.

Alternative Fuels

- That ethanol and biodiesel are examples of biofuels (fuels that are produced from plant material).
- That hydrogen gas (produced by electrolysis of water) can be used as a fuel source.
- The advantages and disadvantages of using each of these alternative fuels.