Using resources

Finite and renewable resources, sustainable development

The natural resources used by chemists to make new materials can be divided into two categories – finite and renewable. Finite resources will eventually run out as they are used faster than the Earth can make them. Examples are fossil fuels and various metals even though we are able to get some valuable materials from places like the oceans.

Renewable resources are ones that can be replaced at the same rate as they are used up or faster. They are derived from plant materials. An example is ethanol, which can be made from sugar from fermentation. Ethanol can be mixed with petrol to create a new fuel for cars (biofuel) instead of pure petrol which is extracted from the finite resource, crude oil.

Many of the Earth's natural resources are running out and if they are used at the current high rates they will be depleted (used up) very soon. In order to increase the lifetime of these finite resources, the industry has to develop processes that increase the lifetime of natural resources.

Sustainable development meets the needs of present development without depleting natural resources. In a sustainable process:

- there is a high yield
- there are few waste products
- there is very little impact on the environment and the products should not harm the environment.

DO IT!

The list below shows different methods of waste management.

Put them in order from 'worst' to 'best' method in terms of increasing the sustainability of a product.

A Burning product to produce energy

B Reuse the product

C Placing in landfill

D Design product differently to prevent waste

E Recycle or compost the product

SNAP IT!

Sustainable processes should do the following:

- have reactions with high atom economy
- use renewable resources
- have as few steps as possible to reduce transfer loss
- use catalysts.

MATHS SKILLS

One of the main concerns related to sustainability is the number of years left before certain finite resources are exhausted.

The remaining reserves are usually in very large amounts and they are usually expressed in millions (10^6), billions (10^9) and trillions (10^{12}).

In order to answer these questions you should be able to manipulate numbers by expressing them in standard form.