

Diagnosis using urine

People consulting their doctor are sometimes asked to provide a urine sample for testing. Finding certain chemicals in urine can often help to diagnose what is wrong. For example:

- Diabetes is an illness in which glucose sugar is found in the urine.
- Finding protein in urine is often a sign of kidney failure.
- In one type of jaundice the bile duct is blocked. This duct carries bile from the gall bladder to the intestines. The blockage causes bile salts to get into the blood and some of these can appear in the urine.

You have urine samples from three patients and one sample from a healthy person.

The doctor suspects that one patient has diabetes, one has jaundice and one has kidney failure. You have to provide her with test results to help make a diagnosis. Here are the tests you can do:

- 1 Sprinkle a little sulfur powder onto a sample in a test-tube. If the sulfur sinks, then bile salts are present.
- 2 Dip the end of a reagent test strip for glucose into a sample in a test-tube. Compare any colour change with the chart.
- 3 Dip the end of a reagent test strip for protein into a sample in a test-tube. Compare any colour change with the chart.

Make a table of your observations and write a short report for the doctor offering your advice on diagnosis.

Corrosion of metals

You have a selection of seven or eight different metals. Try to find out how much they tarnish or corrode when you keep them for a week in air, water and salt water.

First clean all the pieces of metal with emery paper so that they shine.

1 Corrosion in air

Place one piece of each metal in a sandwich box. Also put in a piece of a chemical (such as calcium oxide) that will absorb water vapour from the air. Seal the box. Look at the metals each day and note any changes.

2 Corrosion in water

Fill seven or eight test-tubes to a depth of about 2 cm with water. Place a different piece of metal in each one. Put a cork in the tube. Label the tube with the name of the metal. Leave the tubes for a week. Look at them each day and note any changes.

3 Corrosion with salt water

Repeat experiment 2 using tap water with a little salt added or seawater.

Results

Make a table to show your observations for each experiment each day.

Conclusions

Look for patterns in your results. Which metals corrode most easily? Which metals do not corrode? Which experiment caused the most corrosion? Which caused the least corrosion?

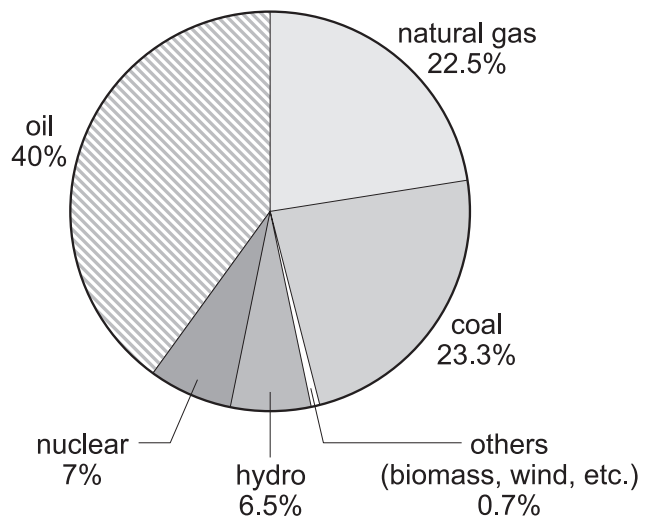
Information about energy resources

This resource sheet shows information displayed in different ways. Translate the information in each diagram or table into another form.

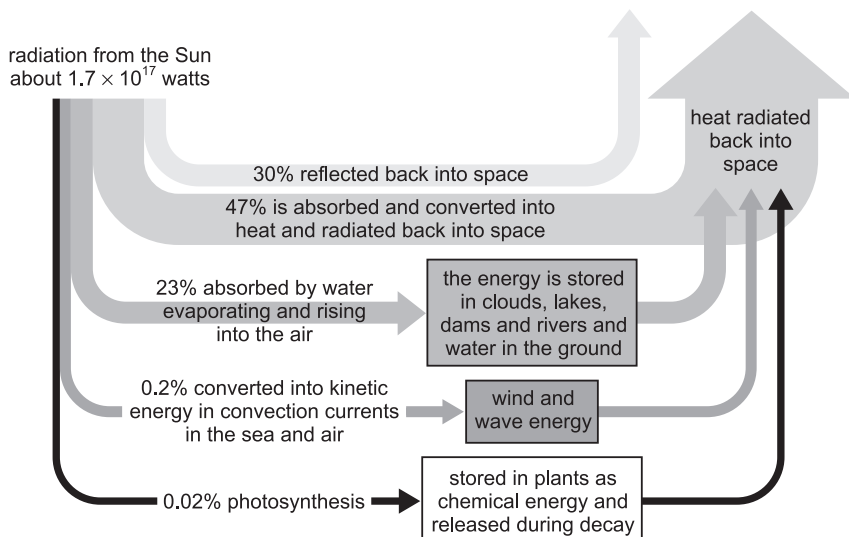
Input and output energy in a coal-fired power station

| Input energy | |
|---|-------------|
| From burning coal | 5500 |
| Output energy | |
| Electrical to the grid | 2000 |
| Heat to the cooling water | 2840 |
| Hot gases to the air | 550 |
| Electrical energy used in running the power station | 110 |
| Total | 5500 |

World annual energy consumption, 1998



Solar energy flow



World average cost (US cents) of generating 1 kW h of electricity, 1998

| | |
|---------|------|
| Oil | 4c |
| Coal | 3c |
| Nuclear | 12c |
| Hydro | 0.5c |
| Wind | 8c |

Interpreting data displays

Answer these questions about the data on Resource 8.3.

Energy transformations in a coal-fired power station

What happens to most of the energy in the coal?

What proportion of the input energy is turned into electrical energy?

World annual energy consumption

Which energy source made the main contribution to world energy consumption?

The pie chart for Qatar would look different. What would the main differences be?

Explain how you think the size of the segments in the pie chart may change in the future.

Solar energy flow

What happens to most of the Sun's energy when it reaches Earth?

What proportion of incoming solar energy is trapped in the form of potential, kinetic and chemical energy before it is released again some time later?

Where is most of the trapped solar energy stored?

If one watt is one joule of energy every second, how many joules of incoming solar energy are converted by plants to chemical energy every second?

Cost of energy generation

Which is the cheapest way of generating electricity?

Why is not all electricity generated in this way?

Is it possible to calculate the average cost of generating the world's electricity from this information?