Worksheet 11.6

Enzymes in industry

Washing powders

Washing powders are designed to get grease and stains out of clothes. In the past, high temperatures were needed to ensure that clothes got completely clean and it was not unusual to boil clothes. This method will not work with many modern clothes because it removes the colour and damages some of the fibres used.

Many modern washing powders contain enzymes. These make the washing powder more effective because:

- they can 'digest' the stains on the clothes – they are particularly good at getting rid of food, blood, grease and other natural stains
- they enable the powder to work at a lower temperature.

However, there are two disadvantages:

- if the wash gets too hot, the enzyme is denatured (destroyed)
- some people are allergic to the enzymes and can develop a rash.

Enzymes are biological compounds called proteins. They control the chemistry which takes place inside all living things.

Using this information, answer the following questions.

1 Give **two** reasons why it is good to wash clothes at a lower temperature.

.....

.....

2 Why do you think enzymes are best at getting rid of stains like food and grease?

.....

.....

3 Why will enzyme washing powders not work as well at temperatures above 40 °C?

.....

.....

4 Enzyme washing powders are often called 'biological'. Why do you think this is? What kind of general chemical agent are they a type of?

.....

.....

Food and drugs

Bread is made with the help of the enzymes in yeast. A little sugar is added and the same reaction that occurs in fermentation takes place. The carbon dioxide gas makes the bread rise.

5 Give the word and chemical equations for the fermentation reaction.

.....

.....

6 Why do you think we don't get drunk eating bread? (What happens to the alcohol?)

.....

.....

Yoghurt is made with the help of an enzyme in bacteria. Some bacteria cause disease but yoghurt bacteria are harmless. They turn the sugar in milk into an acid, and the milk sets to make yoghurt.

Bacteria are also used to change alcohol into **vinegar**.

Biotechnology using bacteria in the manufacture of medicines is a recent development. Modern medicines are complex chemicals and are very difficult to make by normal methods. Bacteria are genetically engineered so that they make these chemicals. This process can make the drugs more cheaply and much purer.

The first drug to be made by a microorganism was penicillin. Penicillin was produced by a mould on an agar plate in a Petri dish and was one of the most important drugs ever discovered, even though it was discovered by accident.

7 Your task is to produce a piece of work about enzymes and how important they are to industrial chemistry. It may be a piece of written work, a poster or a PowerPoint presentation. You will then have the opportunity to discuss your research in groups or with the class.