

Bottles in the laboratory and tankers carrying chemicals on the road all have to carry hazard warning labels to show when there is a chemical hazard. Two common hazard warnings are:



irritant or harmful



corrosive

Acids and **alkalis** can be either **irritant** or **corrosive**. The hazard will depend on the type of acid and whether it is **concentrated** or **dilute**. In factories and in the laboratory at school we need to carry out **risk assessments**. This allows us to consider the level of risk and take action to reduce the chance of harm.

Common acids include vinegar and lemon juice. Fizzy drinks, pickles and spicy sauces also contain acids. Stronger acids, such as sulphuric and nitric acids, can be more dangerous. Often they are corrosive, which means they will attack your skin and seriously harm you. Alkalis can also be corrosive (e.g. oven cleaner). Common weak alkalis include soap and toothpaste.

Sulphuric acid is one of the most important chemicals that is manufactured. It has a wide range of uses, including making paints, dyes and fertilisers.

Indicators are coloured dyes that change colour when mixed with acids or alkalis. They often come from plants such as red cabbage and beetroot. **Litmus** is an indicator that turns red in acids and blue in alkalis.

The strengths of acids and alkalis can be measured on the **pH scale**, which runs from 1 to 14. pH numbers **1** to **6** are acids, **7** is **neutral**, and **8** to **14** are alkalis. You can find out the pH number using a **universal indicator**, or by using a pH meter.

strong acid			weak acid			neutral	weak alkali			strong alkali			
1	2	3	4	5	6	7	8	9	10	11	12	13	14
stomach acid		vinegar		skin		pure water	indigestion powder		washing powder	oven cleaner			
lemon juice		fizzy drinks		milk		blood	toothpaste						

Alkalis can cancel out acids, making them neutral. When this happens it is called **neutralisation**.

Neutralisation can be important:

- in gardening and agriculture, to make sure the soil is the correct pH
- when dealing with insect stings and bites
- to control indigestion caused by excess acid in the stomach
- to keep foods such as jam at the correct pH.

Manufacturing chemicals can be of benefit to society in a number of ways, but there can also be concerns, for example about pollution. The building of chemical factories often causes a lot of debate in local communities, with strong arguments being made both for and against new projects.