Strength and concentration of acids and alkali

MAGS Hi – Mags and Cal here. We're redecorating my room at the moment which means having an epic clear out.

CAL It's taking a lot of strength.

MAGS Handy, because this episode is about the difference between strength and concentration. But in terms of acids and alkalis.

CAL Finding out how strong an acid or alkali is, is all about colour.

We use universal indicator, a mix of dyes that changes colour, to show us what pH a substance is. Just add universal indicator and compare the colour it turns to the colours on the pH scale.

A strong acid, like hydrochloric acid, will have a pH of 1, which is red on the scale.

Remember, pH 0-6 is acid, pH 8-14 is alkali. Weak acids, like ethanoic acid, turn universal indicator orange or yellow.

Neutral substances like water turn universal indicator green and have a pH of 7 – they're neither acid nor alkali.

Strong alkalis, like sodium hydroxide, can be found at the other end of the scale. Universal indicator turns purple and the pH is high at 13 to 14. The further away from neutral pH 7, the stronger the substance and the darker the colour.

But what makes them strong or weak? Let's look at acids. You can tell that an acid is strong by how well it dissociates, which means to split into separate parts, in water.

When acids are dissolved in water, they dissociate, producing hydrogen ions, shown as H^+.

The acid molecules split and release the hydrogen ions.

This hydrochloric acid is a strong acid. If you dissolve it in water, it completely dissociates. The stronger the acid, the more it can split and release those hydrogen ions. Stronger acids also react more violently with carbonates and metals. You'll see lots of fizzing.

They raise the temperature much more than weak acids. With a weak acid like ethanoic acid, fewer hydrogen ions are produced, so it is not fully dissociated. Less dissociation, less of a reaction.

Remember, the strength of acids is not the same as being concentrated or diluted. This lemon juice is quite strongly acidic, with a pH of 2. A concentrated acid has loads more acid molecules in the solution compared to very few water molecules. This lemon juice doesn't become a weak acid just because it's been diluted with water.

A dilute acid has much fewer acid molecules in the solution and loads more water molecules. See, the pH doesn't change when I dilute it with water. It's just less concentrated.

MAGS Ooh, that's just the colour I want for my room.