

THE pH SCALE

Research and Anticipate



Anticipate potential hurdles

Alkalinity and acidity are both measured on the pH scale, but whereas acidity increases with decreasing pH, alkalinity increases as you move further up the scale. This can confuse pupils, so spend time orientating them and reviewing this.



Children often think:

- the pH scale only measures acidity, but they don't consider alkalinity.
- solutions with a low pH are dangerous, but they don't think about solutions with a high pH.
- the pH scale tells you how strong an acid or alkali is.



Language matters

Avoid talking about 'stronger acids' when pH and acidity are introduced. Saying 'more acidic' is a better foundation for later ideas.

Instead of saying:

"Acids have a pH of less than 7. The stronger an acid is, the lower its pH will be."

Say:

"Acidic solutions have pH values of less than 7. The more acidic a solution is, the lower its pH will be."

Using the term 'acidic solution' for common laboratory acids also introduces language underpinning the concept of solvated ions.

Use the RADAAR framework to support curriculum planning, building on the ideas that pupils bring to lessons: <https://eef.li/RADAAR>

Diagnose and Address



Diagnostic question

Ask pupils to explain which of the following statements they agree with, and why.

pH tells you how acidic a solution is.

Monica

The lower the pH, the more dangerous the solution.

Lucy

pH tells you the strength of an acid or alkali.

Priyanka

pH tells you how acidic or alkaline a solution is.

Chantelle



Building on understanding

A pupil agreeing with Monica or Lucy may need reminding that the pH scale measures alkalinity **and** acidity. It works in two directions, with low and high pH representing extremes. Explain that both acids and alkalis can be dangerous.



HAZARD



CORROSIVE



Strong acid



Weak acid

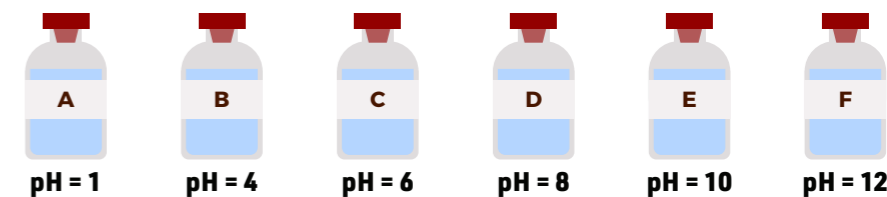
If a pupil agrees with Priyanka, explain that, in chemistry, acid or alkali strength relates to the type of acid or alkali and not the solution.

Assess and Review



Revisit using further examples

Pupils can practise comparing acids and alkalis using pH values.



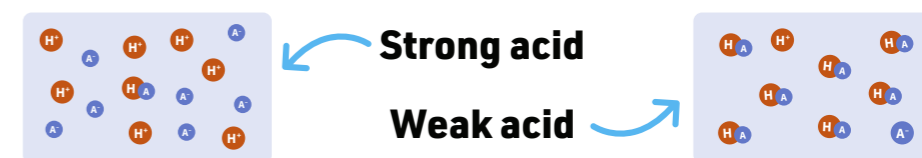
Ask pupils to choose the letter of the solution that matches each statement below:

- A solution that is more acidic than B
- A solution that is more alkaline than E
- The least acidic solution
- The least alkaline solution



Later links

Adding water to an acid or alkali changes its pH. But the strength of an acid or alkali relates to the type of acid or alkali, not its concentration in solution. For a given concentration in aqueous solution, a stronger acid will have a lower pH.



The explanation for this in terms of dissociation of ions will be encountered later, so at this stage just focus on the language you use to describe acids and alkalis.



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Text and activities informed by Best Evidence Science Teaching (BEST). Diagnostic questions taken from associated resources. All BEST resources developed by the University of York Science Education Group and the Salters' Institute. <http://www.stem.org.uk/best-evidence-science-teaching>