

Acids, Bases and the pH Scale

Ages 12–15 • Science

Name _____ Class _____ Date _____

A Key terms: match each term to its meaning

Write the letter of the correct meaning in the box next to each term.

- | | |
|-----------------------|--|
| 1 Acid | ☐ A A scale, usually 0 to 14, that measures how acidic or alkaline a solution is; pH 7 is neutral. |
| 2 Base | ☐ B The reaction between an acid and a base that forms a salt and water and moves the pH towards 7. |
| 3 Alkali | ☐ C A substance that reacts with an acid to form a salt and water. |
| 4 pH scale | ☐ D A substance that forms hydrogen ions (H^+) in water and has a pH below 7. |
| 5 Indicator | ☐ E A mixture of indicators that shows a range of colours across the pH scale, giving an approximate pH. |
| 6 Universal indicator | ☐ F A substance that changes colour depending on whether a solution is acidic, neutral or alkaline. |
| 7 Neutralisation | ☐ G A compound formed when the hydrogen in an acid is replaced by a metal (or ammonium), for example sodium chloride. |
| 8 Salt | ☐ H A base that dissolves in water, forming hydroxide ions (OH^-); its solution has a pH above 7. |

B Quick quiz

Circle the best answer, write its letter, then explain your choice in a few words.

- 1 Which pH value shows the most acidic solution?**

- a) pH 6
b) pH 2
c) pH 7
d) pH 11

Answer: _____ Why? _____

- ## 2 What is the difference between a base and an alkali?

- a) There is no difference
b) An alkali is an acid that dissolves in water
c) An alkali is a base that dissolves in water
d) A base always has a pH of exactly 7

Answer: Why?

- 3** Solution X has a pH of 3 and solution Y has a pH of 4. How does X compare with Y?

- a) X is 10 times more acidic
b) X is 1 more times acidic
c) X is 10 times less acidic
d) They are equally acidic

Answer: Why?

- 4 What are the products when hydrochloric acid neutralises sodium hydroxide?**

- a) Sodium chloride and hydrogen
b) Sodium hydroxide and water
c) Hydrogen and oxygen
d) Sodium chloride and water

Answer: Why?

- 5** A drop of a solution turns red litmus paper blue. What does this tell you?

- a) The solution is alkaline
b) The solution is acidic
c) The solution is neutral
d) The solution has a pH of exactly 7

Answer: Why?

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Answer key for teachers · Ages 12–15 · Science

A Key terms

1 Acid	D	A substance that forms hydrogen ions (H^+) in water and has a pH below 7.
2 Base	C	A substance that reacts with an acid to form a salt and water.
3 Alkali	H	A base that dissolves in water, forming hydroxide ions (OH^-); its solution has a pH above 7.
4 pH scale	A	A scale, usually 0 to 14, that measures how acidic or alkaline a solution is; pH 7 is neutral.
5 Indicator	F	A substance that changes colour depending on whether a solution is acidic, neutral or alkaline.
6 Universal indicator	E	A mixture of indicators that shows a range of colours across the pH scale, giving an approximate pH.
7 Neutralisation	B	The reaction between an acid and a base that forms a salt and water and moves the pH towards 7.
8 Salt	G	A compound formed when the hydrogen in an acid is replaced by a metal (or ammonium), for example sodium chloride.

B Quick quiz

1 b) pH 2

The lower the pH, the more acidic the solution. pH 2 is the most acidic of these; pH 7 is neutral and pH 11 is alkaline.

2 c) An alkali is a base that dissolves in water

A base is any substance that neutralises an acid. An alkali is a base that dissolves in water, so all alkalis are bases but not all bases are alkalis.

3 a) X is 10 times more acidic

Each step on the pH scale is a tenfold change in hydrogen ion concentration, so pH 3 is 10 times more acidic than pH 4.

4 d) Sodium chloride and water

Acid + base → salt + water. The salt is sodium chloride: sodium from the base and chloride from hydrochloric acid.

5 a) The solution is alkaline

Alkalis turn red litmus paper blue. Acids turn blue litmus red, and neutral solutions leave both colours unchanged.