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.