SCIENCE FOUNDATIONS

pH and pOH

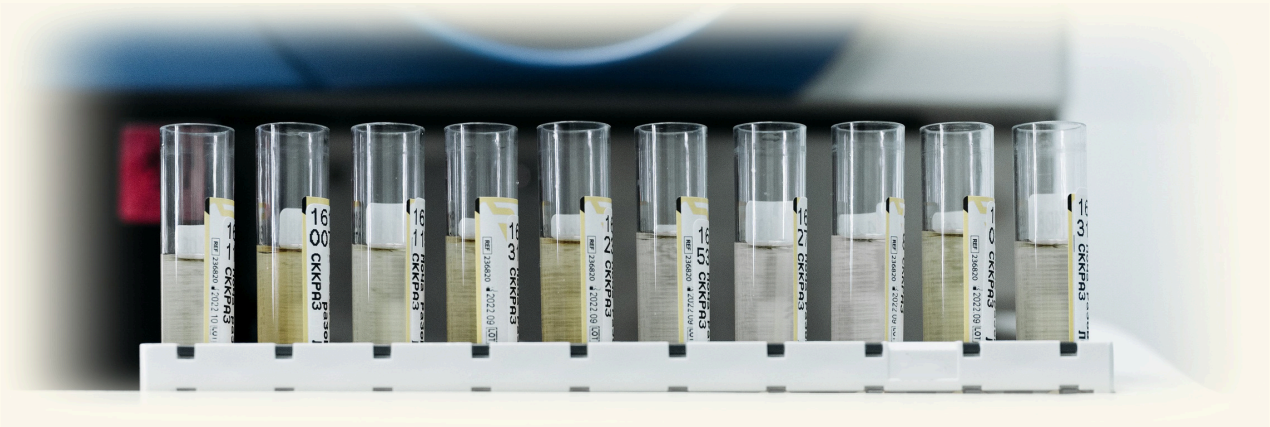
Difficulty level: Advanced

Science Foundations

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Overview of the concept

This is how you check whether pool water, soil, or a shampoo is too acidic or too basic, and how much difference one step on the scale really makes. A pool owner keeps the water in a narrow range so it is safe to swim in and does not sting eyes. A gardener tests soil pH because some plants only thrive in acidic soil and others only in soil closer to neutral. Knowing pH and pOH tells you that each step on the scale is ten times stronger than the last, so a small number change can mean a big difference.



Rule

pH and pOH: pH + pOH = 14.

When the hydrogen ion concentration rises, the pH falls, so a lower pH means a more acidic solution.

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Worked examples

EXAMPLE 1

Q Find the pOH of a solution with pH 3.

SOLUTION

Recall the link:

pH + pOH = 14

Substitute:

3 + pOH = 14

Solve:

pOH = 14 - 3 = 11

The result is pOH 11.

EXAMPLE 2

Q Find the pH of a solution with pOH 9.

SOLUTION

Recall the link:

pH + pOH = 14

Substitute:

pH + 9 = 14

Solve:

pH = 14 - 9 = 5

The result is pH 5.

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Practice questions

1

A solution has pH 5. What is the pOH?

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2

A solution has pOH 4. What is the pH?

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3 **How many times more acidic is a solution with pH 2 than a solution with pH 4?**

A 100 times

B 10 times

C 2 times

D 4 times

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4 **pH plus pOH equals what?**

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5

If hydrogen concentration rises, does pH rise or fall?

A Fall

B Rise

C Stay the same

D Fall then rise

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6

Two solutions have pH 2 and pH 6. Which is more acidic?

A pH 6

B pH 2

C Both equally acidic

D Neither is acidic

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7 A solution with pH 6 is diluted until its hydrogen ion concentration falls to one tenth of what it was. What is the new pH?

- **A** 5
- **B** 7
- **C** 6
- **D** 16

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8 A solution has pOH 9. Is it acidic or basic?

- **A** Acidic
- **B** Basic
- **C** Neutral
- **D** Cannot tell from pOH

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9 What does a one-step pH change mean?

- A. A tenfold change in ion concentration
- B. A doubling of ion concentration
- C. No change in ion concentration
- D. A hundredfold change in ion concentration

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10 A solution has pH 1. Is it acidic or basic?

- A. Acidic
- B. Basic
- C. Neutral
- D. Neither acidic nor basic

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ANSWER KEY

1. 9

2. 10

3. 100 times

4. 14

5. Fall

6. pH 2

7. 7

8. Acidic

9. A tenfold change in ion concentration

10. Acidic

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