

Measuring acidity with the pH scale

Grade 8 science (Year 9 · Class 8) · Lab answers

Model answers are given with the key result in bold. Your own colours may differ slightly because cabbage varieties and lighting vary, so compare reasoning rather than exact shades.

Level: Grade 8 science (Year 9 · Class 8) · **Curriculum:** MS-PS1-2

Question 1 Rank the liquids

The order is lemon juice and vinegar (equal, pH 2 to 3), fizzy water, tap water, baking soda solution, then washing soda solution: **lemon juice = vinegar < fizzy water < tap water < baking soda < washing soda.**

Question 2 Closest pair

Lemon juice and vinegar are closest. Both gave a **red** colour on the same band, pH 2 to 3, so the indicator cannot separate them.

Question 3 Limit of the indicator

Each colour covers several pH units and our eyes cannot tell the shades apart exactly. The method therefore gives **a range, not a single value**. A pH meter gives a precise reading.

Question 4 Fair test

Same volume of sample (5 mL), same volume of indicator (5 mL) and the same time before reading the colour. Also the same cabbage batch: **volumes, time and indicator batch.**

Question 5 Diluting vinegar

The pH rises because the acid is spread out, so the colour moves from red towards pink. Vinegar is a weak acid, so the change is less than one unit. The pH **rises but cannot reach 7.**

Question 6 Why not bleach?

Bleach is corrosive, and it also bleaches the indicator colour, so the result would be wrong. Bleach mixed with acids gives off poisonous chlorine gas. **Hazard and false colour** are the two reasons.

Question 7 Making colours dependable

Use a pH meter to confirm each value, and repeat each test three times. Use a colour chart photographed under the same light. **Meter plus repeats** improves reliability.