

Telling physical and chemical changes apart

Grade 7 science (Year 8 · Class 7) · Lab answers

Model answers using the sample data. One pattern should stand out: gas bubbles and a colour change are strong clues, while a small temperature change is a weak clue. If your own readings differ, check that your reasoning still follows the evidence.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS1-2

Question 1 Classify the cups

A: **physical**: the salt dissolves with no new substance and no gas.

B: **chemical**: strong fizzing is a new gas.

C: **chemical**: bubbles of gas form on the chalk.

D: **chemical**: the colour change shows a new substance (the dye changes form with the acid).

Question 2 Temperature changes

A: $20.8\text{ }^{\circ}\text{C} - 21.0\text{ }^{\circ}\text{C} = -0.2\text{ }^{\circ}\text{C}$.

B: $17.5\text{ }^{\circ}\text{C} - 21.0\text{ }^{\circ}\text{C} = -3.5\text{ }^{\circ}\text{C}$.

Question 3 Is temperature enough?

Cup A (dissolving, physical) and cup B (reaction) both cooled, so cooling does not separate the types. Use the other clues: B made a gas, A did not. **Temperature alone is not proof.**

Question 4 The gas in B and C

The gas is **carbon dioxide**. Bubble it through limewater with a delivery tube. Limewater turns milky if carbon dioxide is present.

Question 5 Word equation for cup C

calcium carbonate + ethanoic acid → calcium ethanoate + water + carbon dioxide.

Question 6 Reliability

A change of $0.2\text{ }^{\circ}\text{C}$ or $0.3\text{ }^{\circ}\text{C}$ is as small as the uncertainty of reading the thermometer and the effect of room temperature. Repeat each test three times, use the same volumes and calculate a mean. **Repeat and average.**

Question 7 A fair test

Any three of: the volume of liquid, the starting temperature, the mass of solid used, the way the mixture is stirred, the time of the final reading. **Control these.**

Question 8 Conclusion

Cup A is a physical change; B, C and D are chemical changes because gas bubbles and a colour change show that new substances were made.