

Telling physical and chemical changes apart

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

Name: _____ Date: _____ Class: _____

Which everyday mixtures are really chemical changes? In this lab you mix four common household materials and look for the clues of a chemical change: bubbles, colour change and temperature change. You will see that some clues are strong and others can mislead, so you must use several clues together before you decide.

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

Aim

To decide, from observations and temperature readings, which of four common mixtures involve a chemical change.

Equipment

- Four clear plastic cups labelled A to D
- Thermometer reading to 0.1 °C
- White vinegar (about 150 cm³) and tap water
- Table salt, baking soda and two small pieces of blackboard chalk
- Red cabbage juice (cooked cabbage leaves in hot water, cooled)
- Measuring cylinder, teaspoon and stopwatch

Safety

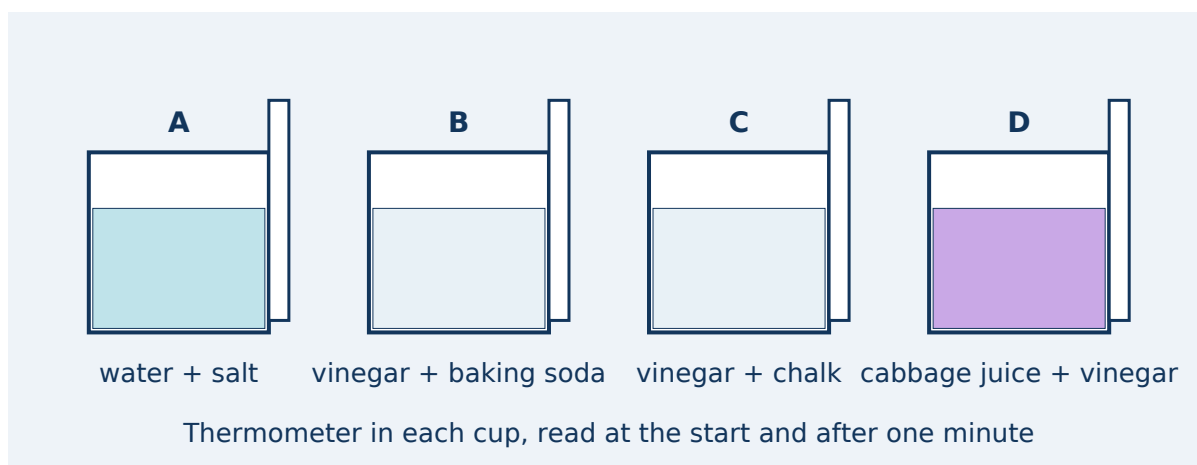
Safety

Wear safety goggles. Do not taste anything. Vinegar can sting the eyes, so rinse with water if you splash it. Stand cups on a tray in case of overflow, and wash your hands at the end.

Method

1. Cup A: put 50 cm³ of water in the cup. Record its temperature, then add one teaspoon of salt and stir.
2. Cup B: put 50 cm³ of vinegar in the cup. Record its temperature, then add one teaspoon of baking soda.
3. Cup C: put 50 cm³ of vinegar in the cup. Record its temperature, then add a piece of chalk.

- Cup D: put 20 cm³ of red cabbage juice in the cup. Record its temperature and colour, then add 20 cm³ of vinegar.
- Watch each cup for one minute, noting bubbles, colour change and smell. Read the thermometer again and record the lowest or highest value.



The four cups. Use a clean thermometer or rinse it between cups.

Results

Sample measurements from one group:

Cup	Start temperature (°C)	End temperature (°C)	Change (°C)	Observations
A	21.0	20.8	−0.2	Salt vanishes, clear liquid, no bubbles
B	21.0	17.5	−3.5	Strong fizzing, then clear liquid
C	21.0	21.3	+0.3	Slow, small bubbles form on the chalk
D	21.0	21.0	0.0	Purple turns pink at once, no bubbles

Analysis questions

Question 1 Classify the cups

Classify the change in each cup as physical or chemical and give the evidence.

Question 2 Temperature changes

Check the temperature change shown in the table for cups A and B by calculation.

Question 3 Is temperature enough?

Cup A and cup B both got colder. Explain why the temperature alone cannot decide which one is chemical.

Question 4 The gas in B and C

Name the gas in cups B and C and describe a test that would prove it.

Question 5 Word equation for cup C

Write the word equation for chalk (calcium carbonate) reacting with ethanoic acid in vinegar.

Question 6 Reliability

The changes in A and C were small. Explain why they may be within measurement error and suggest how to improve reliability.

Question 7 A fair test

State three variables that should be kept the same in cups A to C.

Question 8 Conclusion

Write a conclusion that links the evidence to the type of change in each cup.