

Fire, fuels and burning safely

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

Model answers follow the sample data in the table. Your own readings will differ, but the mist and the milky limewater should always appear for the candle gas and not for the control.

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

Question 1 Mean time

$(12 + 10 + 14) \div 3 = 36 \div 3 = \mathbf{12\ s}$.

Question 2 The mist

The mist is liquid water that condensed from water vapour made by the flame. It shows the wax contains **hydrogen**.

Question 3 The limewater result

Carbon dioxide is present. The white solid is **calcium carbonate**, which also shows the wax contains carbon.

Question 4 The control test

Ordinary air has a tiny amount of CO₂, so the control shows that the milkiness in the candle trials is caused by the extra CO₂ from burning. **It makes the test fair.**

Question 5 Equation for limewater

$\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$. Left: Ca 1, C 1, O 4, H 2. Right: Ca 1, C 1, O 4, H 2.
Balanced.

Question 6 Burning wax

Carbon: 25 CO₂. Hydrogen: 52 H, so 26 H₂O. Oxygen: 50 + 26 = 76, so 38 O₂. **C₂₅H₅₂ + 38 O₂ → 25 CO₂ + 26 H₂O.**

Question 7 Comparing candle and breath

Breath contains a higher concentration of CO₂ and may be blown in more directly; the burnt gas in the beaker is diluted with air. **Breath has more CO₂ per volume.**

Question 8 Improving the lab

Use the same volume of limewater and the same burn time each time, and repeat more times. Also keep the beaker above the flame at a fixed height. **Control variables and repeat.**