

Why total mass stays the same

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

Model answers based on the sample data. The three parts show a clear pattern: mass is unchanged in closed jars and falls in the open cup because a gas leaves. Your own readings will differ slightly, but they should show the same pattern.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS1-5

Question 1 Mean changes

A: $(0.0 + (-0.1)) \div 2 = -0.05 \text{ g}$ (about zero).

B: $(0.0 + 0.0) \div 2 = 0.0 \text{ g}$.

C: $((-1.1) + (-1.2)) \div 2 = -1.15 \text{ g}$.

Question 2 Dissolving and melting

The salt particles spread among the water particles and the ice particles stay the same particles. None leave the sealed jar, so the total mass is unchanged: **mass is conserved**.

Question 3 The open cup

The tablet reacts with water and makes carbon dioxide gas, which escapes from the open cup and carries its mass away. **The gas left the system**, so the balance reading fell.

Question 4 Balance uncertainty

The balance only reads to 0.1 g, so a change of 0.1 g is within its uncertainty. Water on the outside of the jar or a small reading error could also cause it. **It is not a real loss**.

Question 5 Percentage loss

Mean starting mass = $(158.2 + 159.0) \div 2 = 158.6 \text{ g}$.

Percentage loss = $1.15 \div 158.6 \times 100 = 0.73 \%$.

Question 6 Drying the jar

Water vapour in the air condenses on a cold jar and adds a small mass of water on the outside. This would make the jar seem to gain mass. **Drying removes this error**.

Question 7 Showing mass is conserved

Put the tablet in a large closed container so the gas stays inside. A problem is that gas builds

up pressure and the container may burst, so only a very small amount of reactants and a strong container should be used. **Keep the gas in the weighed system.**

Question 8 Conclusion

Mass stays the same when a substance dissolves or melts in a closed container, and falls only when a gas escapes from an open container, so the total mass is conserved.