

How much solute can dissolve in water

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

These model answers use the sample class results from the tables. Your own values will differ, but the saturation point should fall close to the accepted value and the times should decrease as the temperature rises. Check your reasoning against the steps below.

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

Question 1 Saturation range

15.0 g dissolved fully but 18.0 g left grains, so saturation happened between 15.0 g and 18.0 g. **Between 15 g and 18 g.**

Question 2 Convert to 100 mL

Multiply by 2: $15.0 \times 2 = 30$ g and $18.0 \times 2 = 36$ g. **30 g to 36 g per 100 mL.**

Question 3 Estimate and compare

Middle = $(30 + 36) \div 2 = 33$ g. Difference = $36 - 33 = 3$ g. $3 \div 36 \times 100 = 8.3$ %. **The estimate is 33 g, about 8 % below the accepted value.**

Question 4 Pattern in Part B

As the temperature increases from 10 °C to 60 °C, the time falls from 90 s to 24 s. **Hotter water dissolves sugar faster.**

Question 5 Dissolving rate

10 °C: $5.0 \div 90 = 0.056$ g/s. 60 °C: $5.0 \div 24 = 0.208$ g/s. $90 \div 24 = 3.75$. **0.056 g/s and 0.21 g/s: about 3.8 times faster.**

Question 6 Explain with particles

In hot water the water particles move faster, so they hit the sugar crystals harder and more often and carry the sugar particles away more quickly. **Faster particles dissolve the sugar sooner.**

Question 7 Speed or amount

Temperature affects the rate of dissolving, which is how fast, even when it does not affect the solubility, which is how much. **Rate and solubility are different.**

Question 8 Control variables

Mass of sugar, volume of water, stirring speed and crystal size. An error is that the water cools during the test or that the end point is judged by eye. **Controls and error given.**