POPPY SCHOLARS · CHEMISTRY IN THE EARTH SYSTEM

Home lab 10 · Unit 10 · about 45 minutes

How do temperature and surface area change how fast a reaction runs?

Name _____ Date _____

MATERIALS

You supply everything. Tick each item as you gather it.

- ☐ Effervescent tablets of the same kind (a vitamin tablet or an antacid), about 15, kept dry
- ☐ 4 clear glasses of the same size, a measuring cup, and a timer
- ☐ Water at three temperatures: ice water (about 3 °C), room temperature, and hot tap water (about 50 °C)
- ☐ A thermometer, a plastic bag and a spoon for crushing, paper and a calculator

SAFETY

Effervescent antacid tablets may contain aspirin and must not be eaten or given to children as part of this lab. Do not swallow any of the solution. Use hot tap water only, no hotter than 50 °C, and an adult should handle it. Wash your hands afterward. Keep tablets away from children and pets.

PROCEDURE

1. Fill a glass with 200 mL of ice water. Measure and record its temperature. Drop in half a tablet and start the timer.
2. Stop the timer when the tablet has completely disappeared and the fizzing stops. Record the time in seconds.
3. Do 3 trials at each temperature (cold, room temperature, hot), using fresh water each time. Use half a tablet every time.
4. Now compare surface area at room temperature. Crush half a tablet to a powder in a bag, drop it into 200 mL of room-temperature water, and time it. Do 3 trials.
5. Compute the mean time for each condition, and the rate as 1 ÷ time.
6. Compare the rates at room temperature and in hot water, and find how many times faster the reaction became per 10 °C increase.

RECORD YOUR DATA

Condition	Temperature (°C)	Trial 1 (s)	Trial 2 (s)	Trial 3 (s)	Mean (s)
Cold, half tablet					
Room, half tablet					
Hot, half tablet					
Room, crushed half tablet					

LAB REPORT

Write a report that gives your table, calculates the rate for each condition, finds the factor by which the rate changed per 10 °C, and explains each result using collision theory. Say how much of the change you attribute to temperature and how much to surface area, and why the two experiments are tested separately.

Report the numbers you actually got, even when they disagree with the lesson. Write on the lines, or type your report on the website and send it to a teacher there.

Question and hypothesis *State the question in your own words, what you expect to happen, and why you expect it.*

Method *What you changed, what you measured, what you kept the same, and how many trials you ran.*

Observations *Describe what you saw, including anything unexpected. Your data tables are added to the report automatically.*

Calculations *Show each calculation step by step, with units.*

Claim and reasoning *Answer the question using your numbers, then explain why, using the science from the unit.*

Limits and next step *What could have affected your results, and one change you would make next time.*