SCIENCE FOUNDATIONS

Reaction rates

Difficulty level: Intermediate

Science Foundations

This document was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

Overview of the concept

This is how you explain why food spoils faster on a warm counter than in the fridge, and why chopping vegetables cooks them faster than leaving them whole. A cook chills leftovers quickly because cold slows the reactions that spoil food. A pharmacist stores some medicines in the fridge for the same reason. Knowing reaction rates tells you how temperature, surface area, and concentration speed a reaction up or slow it down, and how to control that in the kitchen, the lab, or the factory.

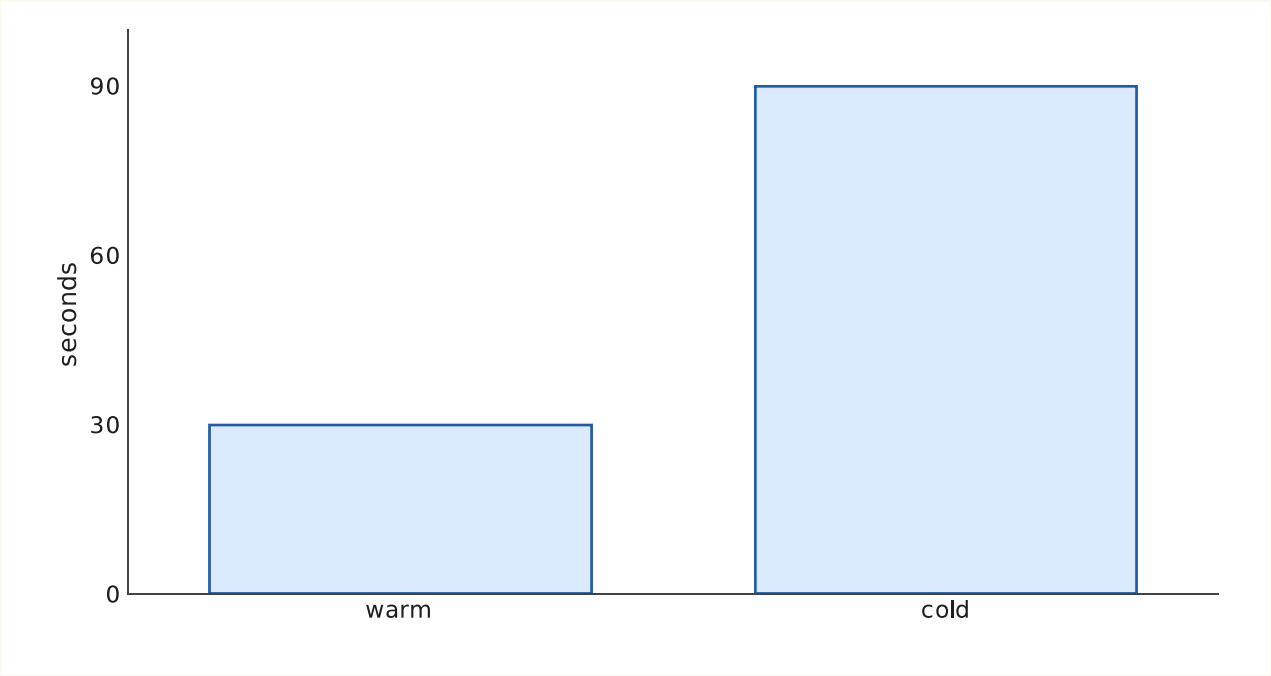


© 2026 Brett Robbins. All Rights Reserved.

Worked examples

EXAMPLE 1

Q Compare dissolving times: sugar in warm water 30 s, in cold water 90 s. Which rate is faster?



SOLUTION

Recall rate: faster means less time for the same change.

Compare times: 30 s is shorter than 90 s.

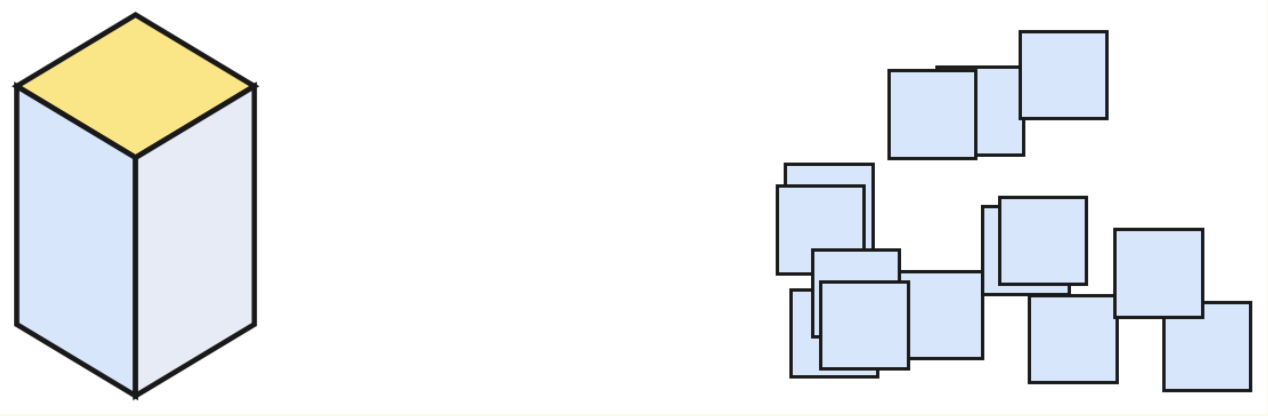
Conclude: warm water gives the faster rate.

The result is warm water, faster rate.

© 2026 Brett Robbins. All Rights Reserved.

EXAMPLE 2

Q How does crushing a solid change its reaction rate?



SOLUTION

Think about surface area: crushing exposes more surface.

More surface means more collisions per second.

Conclude: the rate increases.

The result is crushing increases the rate.

© 2026 Brett Robbins. All Rights Reserved.

Practice questions

1 **Sugar dissolves in warm water in 40 s and in cold water in 120 s. Which rate is faster, and why?**

- **A** Warm water, because the same change takes less time
- **B** Cold water, because the same change takes less time
- **C** Warm water, because the same change takes more time
- **D** Both rates are the same

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

2 **Two identical reactions run, one with a concentrated acid and one with a dilute acid. Which is faster, and why?**

- **A** The concentrated one, because there are more particles to collide per second
- **B** The dilute one, because there are more particles to collide per second
- **C** The concentrated one, because there are fewer particles to collide per second
- **D** Both run at the same rate

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

3

Two identical sugar cubes are stirred into tea. One is whole, one is crushed. Which dissolves faster, and why?

A. The crushed one, because more surface is exposed so there are more collisions per second

B. The whole one, because more surface is exposed

C. The crushed one, because crushing cools the tea

D. Both dissolve at the same rate

Understand It with Pulse

Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

4

The same reaction runs at 20 degrees C and again at 40 degrees C. Which is faster, and why?

A. 40 degrees C, because the particles move faster and collide more often with enough energy

B. 20 degrees C, because the particles move faster and collide more often with enough energy

C. 40 degrees C, because the particles move more slowly

D. Both run at the same rate

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

5 What is the rate of a reaction?

- A Change in amount divided by time
- B Change in amount multiplied by time
- C Time divided by change in amount
- D Amount plus time

Understand It with Pulse | Flag a mistake

6 Does higher temperature increase reaction rate?

- A Yes
- B No

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

7

Does a catalyst get used up in a reaction?

A Yes

B No

Understand It with Pulse | Flag a mistake

8

What must particles do to react?

A Collide with enough energy

B Collide gently

C Stay still

D Move apart

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

9

Does higher concentration increase reaction rate?

A Yes

B No

Understand It with Pulse | Flag a mistake

10

Two identical reactions run, one with a catalyst and one without. Which is faster, and is the catalyst used up?

A The one with the catalyst is faster, and the catalyst is not used up

B The one without the catalyst is faster, and the catalyst is not used up

C The one with the catalyst is faster, and the catalyst is used up

D Both run at the same speed

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

ANSWER KEY

1. Warm water, because the same change takes less time

2. The concentrated one, because there are more particles to collide per second

3. The crushed one, because more surface is exposed so there are more collisions per second

4. 40 degrees C, because the particles move faster and collide more often with enough energy

5. Change in amount divided by time

6. Yes

7. No

8. Collide with enough energy

9. Yes

10. The one with the catalyst is faster, and the catalyst is not used up

© 2026 Brett Robbins. All Rights Reserved.