# Rate Laws from Initial-Rate Data

Grade 11 Worksheet — g11_u03_w09

**I can:** use controlled initial-rate data to infer a rate law and defend what the data do and do not establish. All trials are fictional/no-materials simulations. Rate units are M $s^{-1}$; concentrations are M.

| Trial | [A] | [B] | initial rate |
|---|---|---|---|
| 1 | .100 | .100 | .0200 |
| 2 | .200 | .100 | .0800 |
| 3 | .100 | .200 | .0400 |
| 4 | .300 | .100 | .180 |

1. Identify the controlled variable pair for A order.

2. Calculate rate factor 2/1.

3. Infer A order.

4. Calculate rate factor 3/1.

5. Infer B order.

6. Write the rate law.

7. Find k with Trial 1.

8. State k units.

9. Predict rate at [A]=.150,[B]=.200.

10. Explain why initial rates reduce changing-concentration complications.

11. A student compares Trials 2 and 3. Critique.

12. Retrieval: distinguish a coefficient from a rate-law exponent.

13. Data card: C doubles while rate unchanged. Infer C order.

14. Data card: D triples and rate increases 27-fold. Infer D order.

15. For rate=k$[A]^2[B]$, calculate rate factor if A halves and B doubles.

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16. Explain why reaction order need not equal balanced-equation coefficient.

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17. What does a rate law not reveal about elementary steps/mechanism?

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18. A trial has a temperature change. Why is it not a clean concentration-order comparison?

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19. Give one measurement limitation of a simulated initial rate.

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20. Write a bounded conclusion for the table: include law, k, and one limitation.

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