# Competition Corner: Read the Slope, Limit the Claim

Concentration and Temperature Effects | g10_u03_w10

All values are supplied concentration-time data. Use a positive disappearance rate, report units, and distinguish an observed graph/rate pattern from a collision-model inference or a mechanism claim.

1. A reactant has [R] = 0.960 M at 0 s, 0.780 M at 15.0 s, and 0.660 M at 30.0 s. Calculate the two interval average disappearance rates and the 0–30.0 s average. Explain whether the data support a constant average rate over the two listed intervals.

2. Two matched cards have the same reactant concentration at $t = 0$: Card X drops by 0.120 M in 20.0 s at 300 K; Card Y drops by 0.240 M in 20.0 s at 320 K. Calculate the rate factor, state a collision-energy interpretation, and give two alternative conditions that must have been controlled before attributing the difference to temperature.

3. Sketch two concentration-time curves with the same initial concentration: one with a larger early slope magnitude that later flattens, and one with a constant slope. Label which slope-based observations are direct from the graph and which collision explanation would be an inference.

4. Critique: "Because the rate triples when concentration doubles, the molecularity must be three." Replace it with a defensible claim and name a follow-up data set that would make the inference stronger without proving a mechanism.