

Competition Corner: Faster Path, Same Destination

Catalysts and Graphical Rate Reasoning | g10_u03_w11

Treat all cards as supplied data. Show units, distinguish a direct rate observation from a pathway inference, and do not claim that a catalyst changes ΔH , specified-state ΔG , or the equilibrium position at the same conditions.

1. A reactant changes from 0.900 to 0.750 M in 15.0 s without catalyst and from 0.900 to 0.600 M in 15.0 s with catalyst. Calculate both average disappearance rates and the factor. Name two controls that make the comparison interpretable.
2. An energy card gives reactants = 55 kJ/mol, products = 15 kJ/mol, uncatalyzed peak = 155 kJ/mol, catalyzed peak = 95 kJ/mol. Calculate both forward barriers and ΔH . Explain why all three calculations address different features of the evidence.
3. A reversible system reaches constant concentrations at 10 min without catalyst and 3 min with catalyst, with the same final measured concentrations. Write a claim that uses this evidence correctly, then state one additional measurement that would strengthen the claim that both directions were accelerated.
4. Diagnose: “The catalyzed curve is steeper, so the catalyst shifts equilibrium toward products.” Correct the statement in two sentences using rate, forward/reverse change, and equilibrium position.