

Grade 10 Unit 3 Quiz: Kinetics

Collision models, rate data, catalysts, and bounded conclusions

Name: _____

Date: _____

Time: 30 minutes. **Tools:** calculator permitted. Rate data are fictional paper models. State what a graph or table supports and what it does not establish.

1. Which change most directly increases fraction of collisions with enough energy to react? [1 pts]

- A. Lowering temperature
- B. Raising temperature
- C. Removing all reactant particles
- D. Increasing product concentration only

2. Reactant concentration falls from 0.80 M to 0.50 M in 15.0 s. Calculate average rate of disappearance. [2 pts]

3. A concentration-versus-time graph is steep at first and then less steep. Describe rate change and give one particle-model reason consistent with the graph. [2 pts]

4. A catalyst pathway has lower activation energy. Does catalyst change ΔH or equilibrium constant at the same temperature? Explain. [2 pts]

5. Interpret the controlled data card.

[3 pts]

Trial	[A] (M)	Initial rate (units/s)
1	0.10	2.0
2	0.20	4.0
3	0.20	4.1

State pattern supported by Trials 1 and 2. Then explain how Trial 3 affects confidence in measurement without claiming a complete rate law.

6. Proposed rate law: $\text{rate} = k[A]^2[B]$. If [A] doubles while [B] fixed, by what factor does rate change? If [B] triples while [A] fixed, by what factor?

[2 pts]

7. A student computes k from one trial and calls it "the permanent speed of this reaction in every container." Identify one problem.

[2 pts]

8. Two groups time a color change with different endpoint descriptions. Give one error-analysis improvement and explain why it improves evidence quality.

[2 pts]
