

Cumulative Team Challenge: Argument from Chemistry Evidence

Student Worksheet | g10_u09_w35

I can: use a fictional team-role card to check a chemistry argument for calculations, conditions, evidence, and limits.

Scope card: The roles and data are fictional paper models. No names, personal data, collection, experiments, or procedures are involved. The dataset supports calculations and bounded claims only; it does *not* establish policy, health, safety, product, environmental, or real-system conclusions.

fictional role	responsibility in the paper challenge
data analyst	checks calculations and units
model checker	identifies the stated condition/model boundary
evidence auditor	identifies support and missing evidence
communicator	writes a claim with an explicit limit
evidence card	supplied fictional values
equation	$2R \rightarrow S$; 0.80 mol R available
kinetics	fixed condition F: $[R]$ 0.10 to 0.20 M; rate 2.0 to 8.0 units
equilibrium	stated model mixture: $Q = 3.0$, $K = 1.0$
acid-base	pH 4.00; use $[H_3O^+] = 10^{-pH}$
electrochemistry	cathode +0.20 V; anode -0.30 V

Argument card: Claim A: "The equation predicts 0.40 mol S." Claim B: "Because Q is greater than K, the model is reactant-directed." Claim C: "The kinetics card establishes a rate law for all conditions." Claim D: "pH 4.00 identifies every solute." Each claim must be checked only against the printed card.

1. Which fictional role checks calculations and units?

2. Which fictional role identifies missing evidence?

3. Which fictional role writes an explicit claim limit?

4. Calculate the equation-model amount of S predicted from 0.80 mol R.

5. Does Claim A match the equation model? Explain.

6. By what factor does $[R]$ change in the kinetics card?

7. By what factor does the printed rate change?

8. What is the narrowest rate statement supported by this fixed-condition card?

9. Why is Claim C an overclaim?

10. Compare Q and K in the equilibrium card.

11. Does Claim B match the Q/K direction rule? Explain.

12. Why does the equilibrium card not state how fast the change occurs?

13. Calculate $[H_3O^+]$ from pH 4.00.

14. Why is Claim D an overclaim?

15. Calculate $E_{\text{cell}}^{\circ} = E_{\text{cathode}}^{\circ} - E_{\text{anode}}^{\circ}$.

16. Which role should flag that a positive calculated potential is not a safety or product conclusion?

17. Identify one calculation and one model-boundary statement that could support a team argument.

18. Critique: "Our fictional role card proves that a real team will reach the best decision."

19. Critique: "The pH, Q/K, and cell-potential values together prove a policy or health recommendation."

20. Write a team-ready CER: include one calculation, one model comparison, the role that checks each, and two explicit dataset boundaries.
