Grade 10 Chemistry Final Exam

Cumulative Units 1–9: quantitative, systems, evidence, and transfer

Name: _____ **Date:** _____

Time: 75 minutes. Calculator permitted. Show units and reasoning. All contexts are fictional paper models. Total: 36 points.

1. Balance $C_3H_8 + O_2 \rightarrow CO_2 + H_2O$. [2 pts]

2. A sample is 40.0% C, 6.7% H, 53.3% O. Determine empirical formula. [3 pts]

3. A reaction has $\Delta H = -85$ kJ. State energy direction; then calculate heat absorbed by a 50.0 g water sample warming 4.0 C, $c = 4.184$. [3 pts]

4. A concentration-time graph slopes downward, becoming less steep. Draw a labeled sketch and explain rate trend using collision model. [3 pts]

5. For $A \rightleftharpoons B$, $Q = 4.0$, $K = 1.0$. Predict direction and justify. [2 pts]

6. A solution has pH 2.00. Calculate $[H_3O^+]$. Explain why pH alone does not establish safety or other-solute concentration. [3 pts]

7. A galvanic cell has $E^\circ_{\text{cathode}} = +0.34$ V and $E^\circ_{\text{anode}} = -0.76$ V. Calculate E°_{cell}, then state electron direction. [3 pts]

8. A structure card shows CH_3CH_2OH. Identify functional group, one plausible intermolecular attraction, and one boundary on what the card can establish. [3 pts]

9. A half-life model shows a population halves every interval. State what it predicts for a population and what it cannot predict for one atom. [3 pts]

10. A table shows repeated trials: higher concentration corresponds with higher initial rate. State a supported association in the stated trials, a variable to control, and a claim not established. [3 pts]

11. A student says an 80% yield means atoms disappeared and a positive cell potential proves a battery safe. Correct both using conservation and model limits. [3 pts]

Item 12 — Extended CER continuation

12. A fictional material loses less mass than a comparison after the same stated exposure. Write a bounded claim, cite the comparison evidence, explain a materials-model connection, and name **one limitation and one next measurement**. [5 pts]