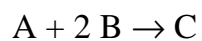


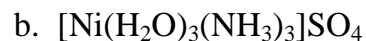
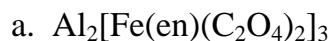
1. Use the following data to determine the *rate law*, the *rate constant* and the *overall order* for the following reaction:



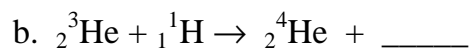
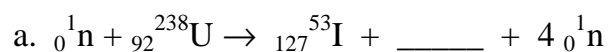
The following data were taken at 25°C.

$[A]_0$ (mol L ⁻¹)	$[B]_0$ (mol L ⁻¹)	Initial rate (mol L ⁻¹ s ⁻¹)
0.0010	0.0010	1.35×10^{-4}
0.0020	0.0010	1.08×10^{-3}
0.0020	0.0030	1.87×10^{-3}

2. (20 pts) *Name* the following compounds.



3. *Complete* the following nuclear equations.

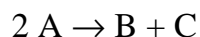


c. Beta decay of Berkelium-248

d. Positron emission of Copper-65

4. Calculate the amount of *energy, in MJ*, released when 15.0 g of Uranium-238 undergoes alpha decay.

5. A second order reaction:



has a half-life of 53.67 s when the initial concentration of A is 0.3453 M. What is the *rate constant* for this reaction?

How *many seconds* will it take for the concentration of A to drop to 0.0023 M if the initial concentration is 0.0103 M?

6. Calculate the *equilibrium constant* for a cell comprised of the Cd^{2+}/Cd and the $\text{MnO}_4^-/\text{Mn}^{2+}$ half-cells if the initial concentrations are:

$$[\text{Cd}^{2+}] = 0.15 \text{ M}, [\text{MnO}_4^-] = 0.30 \text{ M}, \text{ and } [\text{Mn}^{2+}] = 0.10 \text{ M}$$

Write the *cell notation* for this cell.

Calculate the *actual cell voltage*.

7. *Write formulas* for the following.

a. Tris(ethylenediamine)cobalt(III) Nitrate

b. Calcium Triaquatrchloromanganate(VI)

8. Carbon reacts with steam to produce Carbon Monoxide and Hydrogen gas. If a 250.0 L vessel contains 15.00 moles of steam at 300°C, what will be the *equilibrium mixture composition* when this system comes to equilibrium?

9. A solution contains 4.87×10^{-2} M Manganese(II) ions and 7.45×10^{-2} M Cadmium ions. What **range of carbonate ion concentration** is required to precipitate one ion and not the other? **Which ion will precipitate first** as we increase the carbonate ion concentration?

10. An electrode is prepared by dipping an Silver strip into a saturated solution of Silver Chromate containing 0.0500 M CrO_4^{2-} . Using the K_{sp} in the chart determine the **cell voltage** for this electrode paired with a Standard Hydrogen Electrode.

11. A rock is found outside of a volcano. It is found to have 3.56 mg of Lead and 6.57 mg of Uranium-238. The half-life of U-238 is 4.5×10^9 years. How many *years* old is the rock?