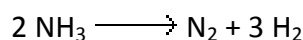


1. Please identify the following statements as either true or false:

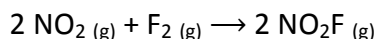
- a) _____ Adding solute to a pure solvent widens the temperature range at which the solution is liquid.
- b) _____ The units of the rate constant, k , are the same for all order reactions.
- c) _____ The graph of reactant concentration vs. time is linear for all order reactions.
- d) _____ Radioactive decay is always a first-order process.
- e) _____ For first-order reactions, the reaction half-life is always $t_{1/2} = \frac{\ln 2}{k}$.
- f) _____ The order of a reaction with respect to a particular reactant is always that reactant's stoichiometric coefficient as written in the reaction.
- g) _____ The concentration of a catalyst can never appear in the rate equation.
- h) _____ A catalyst can increase the rate at which reactants are converted to products.
- i) _____ A catalyst can make a reaction more product favored.

2. For the following reaction at 856 °C:



the average rate of disappearance of NH_3 over the time period from $t = 0$ s to $t = 4186$ s is found to be $1.50 \times 10^{-6} \text{ M s}^{-1}$. The average rate of formation of H_2 over the same time period is:

3. Write an expression for the reaction rate law and calculate the value of the rate constant, k based on the following data. What is the overall order of the reaction?



[NO ₂] (M)	[F ₂] (M)	Initial Rate (M/s)
0.100	0.100	0.026
0.200	0.100	0.051
0.200	0.200	0.103
0.400	0.400	0.411

4. Please use the table below to determine the order of NOBr decomposition and the value of k:

Time (s)	[NOBr] (M)	ln[NOBr]	1/[NOBr]
10	0.50		
20	0.33		
30	0.25		
40	0.20		

5. The decomposition of XY is second order in XY and has a rate constant of $7.02 \times 10^{-3} \text{ 1/M}\cdot\text{s}$ at a certain temperature:

- How long will it take for the concentration of XY to decrease to 12.5% of its initial concentration when the initial concentration is 0.100 M?
- How long will it take for the concentration of XY to decrease to 12.5% of its initial concentration when the initial concentration is 0.200 M?
- If this were a first order reaction, how would your calculations differ? Please explain briefly.
- If the initial concentration of XY is 0.052 M, what is the concentration of XY after 64 s?