

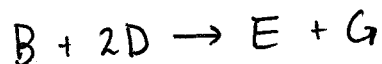
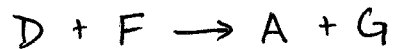
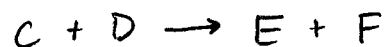
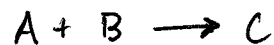
1) The rate constant of a certain reaction is  $k = 6.0 \times 10^{-2} \text{ M}^{-1} \text{ s}^{-1}$ . If the reaction began with a substance of concentration  $0.20 \text{ M}$ , determine the substance's half life.

2) For a certain reaction, the activation energy is  $675 \text{ KJ/mol}$ , and the change in enthalpy is  $-50 \text{ KJ/mol}$ . Find the activation energy of the reverse reaction.

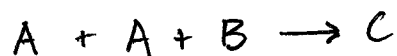
3) Write the equilibrium constant:



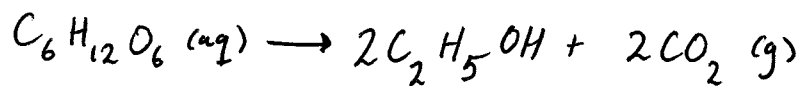
4) Determine the intermediate(s) in the following reaction mechanism:



5) What is the molecularity of the following elementary reaction?

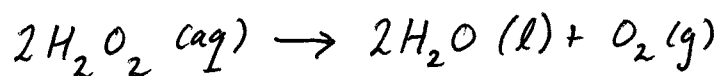


6) Given the rate of formation of  $C_2H_5OH$  is  $0.30 \text{ M/s}$ , determine the rate of consumption of  $C_6H_{12}O_6$ :

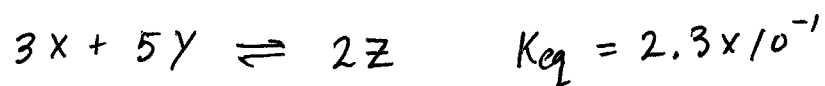


7) Radioactive  $^{241}\text{Pu}$  has a half life of 14 years. Assuming it decays according to 1<sup>st</sup> order kinetics, determine how long it takes for 20% of the starting amount to decay.

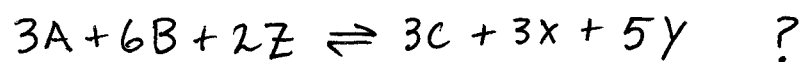
8) 2 moles of  $\text{H}_2\text{O}_2$  are placed into a 4 L container, and the following reaction proceeds with a rate constant of  $2.1 \times 10^{-6} \text{ s}^{-1}$ . What is the concentration of  $\text{H}_2\text{O}_2$  35 minutes after the reaction begins?



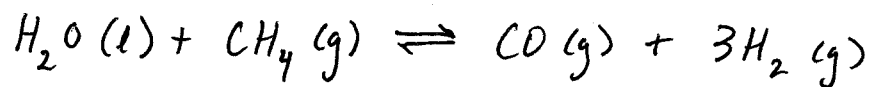
9) Given:



What is  $K_{eq}$  for:



10) Find  $K_p$  of the following reaction  
given  $K_c = 4.1 \times 10^2$  at  $16.2^\circ\text{C}$ :



11) Credit: utexas.edu

Given:

Trial	[A]	[B]	Rate
1	0.1 M	0.1 M	$1 \times 10^{-4}$ M/s
2	0.1 M	0.2 M	$1 \times 10^{-4}$ M/s
3	0.3 M	0.1 M	$3 \times 10^{-4}$ M/s

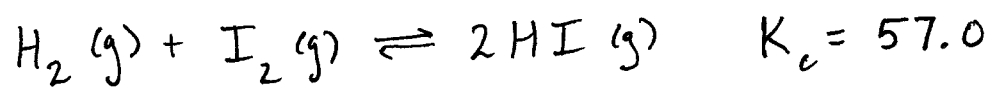
Determine:

- order with respect to A
- order with respect to B
- Rate constant

12) A graph of  $\frac{1}{[X]}$  vs. time generates a linear plot for the reaction  $X \rightarrow Y$ . Determine the differential rate law of the reaction.

13) Calculate the equilibrium concentrations of  $H_2$ ,  $I_2$ , and  $HI$  at 700 K if the initial concentrations are:

$$[H_2]_0 = 0.100 \text{ M}, [I_2]_0 = 0.200 \text{ M}$$



14) A certain reaction has an activation energy of 43.165 KJ/mol.

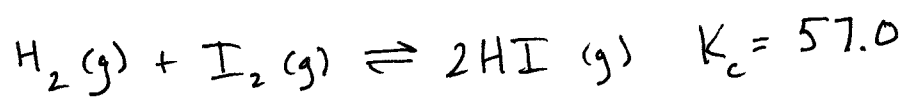
How much faster will the reaction proceed at 600 Kelvin than at 419 Kelvin?

(Round to nearest whole number).

15) Devise a mechanism for the following overall reaction given its experimental rate law is  $R = k[\text{NO}_2]^2$  :



16) Given  $[H_2] = 0.05 \text{ M}$ ,  $[I_2] = 0.15 \text{ M}$ ,  
and  $[HI] = 0.42 \text{ M}$ , which direction  
will the following reaction proceed?



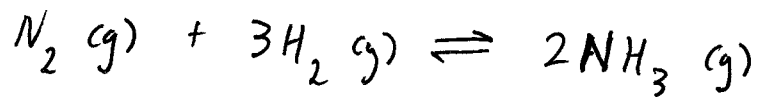
17) For the reaction at equilibrium:



- What happens to  $[CO_2]$  when  $CaCO_3$  is added?
- What happens to the amount of  $CaCO_3$  when some  $CO_2(g)$  is removed?



18) For the reaction at equilibrium in a sealed container:



Which direction will the reaction shift if the volume of the container decreases?

19) In order to maximize yield of products, would you increase or decrease the temperature of the following rxn at equilibrium?

