●Chemical Kinetics

If the rate of decomposition of PH_3 is 0.328 M/s, what is the rate of formation of H_2?
$4\ PH_3 \rightarrow P_4 + 6H_2$

Iron(II) is oxidized to iron(III) by chlorine in an acidic solution
$2Fe^{2+} + Cl_2 \rightarrow 2Fe^{3+} + 2Cl^{1-}$ catalyst: H^{1+}
Consider the following data:

	Initial Conc (M)			Initial Rate (M/s)
	Fe^{2+}	Cl_2	H^{1+}	
Exp 1	0.0020	0.0020	1.0	1.0×10^{-5}
Exp 2	0.0040	0.0020	1.0	2.0×10^{-5}
Exp 3	0.0020	0.0040	1.0	2.0×10^{-5}
Exp 4	0.0040	0.0040	1.0	4.0×10^{-5}
Exp 5	0.0020	0.0020	0.5	2.0×10^{-5}
Exp 6	0.0020	0.0020	0.1	1.0×10^{-4}

What is the rate law for the reaction? What is the rate constant?

Cyclobutane decomposes when heated to form ethylene; the rate constant is 5.09×10^{-4}/s. In an experiment, the initial concentration of cyclobutane was 0.00150 M. After heating at 450°C for 751 s, what is the concentration of cyclobutane?

The disproportionation of *para*-toluenesulfonic acid has a rate constant of 0.1372/(M**·**min) at room temperature. If the initial sample of *para*-toluenesulfonic acid is 0.100 M, how long would it take for the concentration to decrease to 0.0351 M?

In the presence of excess thiocyanate ion, the following reaction occurs; the rate constant is 2.0×10^{-6}/s.
Cr^{3+}(colorless) + $SCN^{1-} \rightarrow Cr(SCN)^{2+}$(ginger)
If 85.0% reaction is needed to obtain a noticeable color from the formation of $Cr(SCN)^{2+}$, how many hours will it take for color to appear?

Consider the isomerization of methyl isocyanide:
$CH_3NC(g) \rightarrow CH_3CN(g)$
At 230°C, the rate constant for the reaction is 6.3×10^{-4}/s. What is the half life? How long would it take for the concentration of CH_3NC to decrease to 25% of its initial value?

The rate of a reaction quadruples when the temperature is increased from 25°C to 35°C. Calculate the activation energy for this reaction.

Consider the following reaction with experimental rate law of rate = k[$(CH_3)_3CBr$].
$(CH_3)_3CBr + OH^{1-} \rightarrow (CH_3)_3COH + Br^{1-}$
Is the following mechanism plausible?
$(CH_3)_3CBr \rightarrow (CH_3)_3C^{1+} + Br^{1-}$ slow
$(CH_3)_3C^{1+} + OH^{1-} \rightarrow (CH_3)_3COH$ fast