Ex 32 - Kinetics refresher

 \longrightarrow H₃C—SCH₃ + HBr

Question One

From the data given, work out the rate law for the following overall reactions.

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[CH ₃ Br]	[CH ₃ SH]	Rxn Rate
1.3 M	1.3 M	0.6 M/s
1.3 M	2.6M	1.2 M/s
0.65 M	1.3 M	0.3 M/s

 $H_3C - Br + CH_3SH$

Rate = $k[CH_3Br][CH_3SH]$



[(CH ₃) ₃ CBr]	[CH ₃ SH]	Rxn Rate
0.90 M	1.3 M	0.5 M/s
1.8 M	1.3 M	1.0 M/s
1.8 M	2.0 M	1.0 M/s

Rate = $k[(CH_3)_3CBr]$

Question Two

What is the rate law for the following overall reaction?



You cannot deduce the rate law for an overall reaction just by looking at it. You must do the type of experiment shown in Question One. Rate laws must be determined by experiment.

Question Three

Reaction A is faster than Reaction B for equal concentrations of reactants at the same temperature. What can you say about:

- The activation energy of Reaction A vs Reaction B. must be lower.
- ΔG° of Reaction A vs Reaction B? Nothing.

Question Four

Given the following elementary processes, determine the order of reaction and write the rate law.



Question Five

Given the results of Question One, determine which of the following mechanisms is consistent with which reaction and indicate what conditions may apply.

Mechanism One

1) H_3C -Br + CH_3SH $---- H_3C$ $-SCH_3$ + HBr

Mechanism Two



The first reaction follows second order kinetics so the first mechanism is consistent with this.

The second reaction follows a first order rate law so must involve a unimolecular process in the rate determining step. The second mechanism is consistent with this as long as the first step is the slowest.