## Ex 32 - Kinetics refresher

## Question One

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

$$
\mathrm{H}_{3} \mathrm{C}-\mathrm{Br}+\mathrm{CH}_{3} \mathrm{SH} \longrightarrow \mathrm{H}_{3} \mathrm{C}-\mathrm{SCH}_{3}+\mathrm{HBr}
$$

| $\left[\mathrm{CH}_{3} \mathrm{Br}\right]$ | $\left[\mathrm{CH}_{3} \mathrm{SH}\right]$ | Rxn Rate |
| :---: | :---: | :---: |
| 1.3 M | 1.3 M | $0.6 \mathrm{M} / \mathrm{s}$ |
| 1.3 M | 2.6 M | $1.2 \mathrm{M} / \mathrm{s}$ |
| 0.65 M | 1.3 M | $0.3 \mathrm{M} / \mathrm{s}$ |



| $\left[\left(\mathrm{CH}_{3}\right)_{3} \mathrm{CBr}\right]$ | $\left[\mathrm{CH}_{3} \mathrm{SH}\right]$ | Rxn Rate |
| :---: | :---: | :---: |
| 0.90 M | 1.3 M | $0.5 \mathrm{M} / \mathrm{s}$ |
| 1.8 M | 1.3 M | $1.0 \mathrm{M} / \mathrm{s}$ |
| 1.8 M | 2.0 M | $1.0 \mathrm{M} / \mathrm{s}$ |

## Question Two

What is the rate law for the following overall reaction?


## 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.
- $\Delta \mathrm{G}^{\circ}$ of Reaction A vs Reaction B?


## Question Four

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


$\mathrm{H}_{2} \mathrm{O}$



## 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) $\mathrm{H}_{3} \mathrm{C}-\mathrm{Br}+\mathrm{CH}_{3} \mathrm{SH} \longrightarrow \mathrm{H}_{3} \mathrm{C}-\mathrm{SCH}_{3}+\mathrm{HBr}$

Mechanism Two
1)


2)

3)


