Some Useful Data!!
1000 J = 1 kJ
$T(K) = T(^{\circ}C) + 273.15^{\circ}C$
R = 8.314 J/K⋅mole





1. Below is the reaction mechanism for the reaction between aqueous chlorine and hydrogen sulfide.

Step 1	$Cl_2 + H_2S$	\rightarrow	$HCl + Cl^+ + HS^-$
Step 2	$Cl^+ + HS^-$	\rightarrow	HCl + S
Net Reaction:	$Cl_2 + H_2S$	\rightarrow	2HCl + S

Circle the correct pair of intermediates below:

a) $Cl_2 + H_2S$ b) $HCl + Cl^+$ c) HCl + S d) $Cl^+ + HS^-$

2. The rate constant for the decomposition of N₂O₅ at 45°C is $k = 5.1 \times 10^{-4} \text{ s}^{-1}$. If this reaction has an activation energy of 103 kJ/mol determine the value of the rate constant at 50°C.

3. Consider the following first order reaction in which $k = 5.2 \times 10^{-3} \text{ s}^{-1}$ at 65°C and the initial concentration is 0.040 M N₂O₅.

$$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$$

a) Determine the half-life for the reaction.

b) Calculate the concentration of N_2O_5 10.0 minutes after the start of the reaction.

c) How long will it take for the concentration of N_2O_5 to drop to 0.015 M.

Answer Set for CHEM 1105 TEST#4

1.d)

2 9.3×10⁻⁴ s⁻¹

3.a) 130 s; b) 0.0018 M; c) 190 s