CHE 112 - Homework - Ch 17b

OER 17.2-17.3 **Integrated Rate Laws and Half-Life** Score: _____/30

Name: _____ Date: _____

[8 pt] 1. The reaction: $CH_3-N\equiv C \longrightarrow CH_3-C\equiv N$ is a first order reaction with a rate constant of $5.11\times10^{-5}s^{-1}$ at 472 K and an initial concentration of the reactant 0.0340 M. Answer the following questions:

(a) What is the molarity of the reactant after 2.00 hours? 1(a) _____

(b) How many minutes does it take for the reactant concentration to decrease to 0.0300 M? 1(b) _____

(c) How many minutes does it take for 20% of the reactant to react? 1(c) _____

(d) What is the half-life in hours of the reaction? 1(d) _____

[8 pt] 2. Hydrogen iodide decomposes slowly into H_2 gas and I_2 gas at 600 K. The reaction is second order in HI and the rate constant is $9.7\times10^{-6}M^{-1}s^{-1}$. If the initial concentration of HI is 0.100M:

(a) What is the molarity after a reaction time of 6.00 days? 2(a) _____

(b) What is the time (in days) when the HI concentration reaches a value of 0.020 M? 2(b) _____

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[4 pt] 3. Nitrosyl bromide decomposes at 10°C: $2NOBr(g) \longrightarrow 2NO(g) + Br_2(g)$. Given the following kinetic data determine the order of the reaction and the value of the rate constant for the consumption of NOBr. Attach your graph(s) to the back of the homework.

Time (sec)	[NOBr] (M)
0	0.0400
10	0.0303
20	0.0244
30	0.0204
40	0.0175

[10 pt] 4. Consider the generic reaction $AB \longrightarrow A + B$. Attach your graph(s) to the back of the homework.

Time (min)	[AB] (M)
0	0.200
20	0.185
40	0.170
60	0.155
80	0.140

(a) Determine the rate order of the reaction. 4(a) _____

(b) What is the value of the rate constant? 4(b) _____

(c) What is the molarity of AB after a reaction time of 126 min? 4(c) _____

(d) What is the time (in minutes) when the AB concentration reaches a value of 0.100 M? 4(d) _____