Lesson 36: Kinetics(rate laws) text: 567-581

what to know:

-what is meant by reaction rates, how they are measured and expressed, §14-1

-reactions rates and concentrations of reactants (rate laws, rate constants, reaction order, etc.) and how they are determined from experimental data, §14-2

-relationships between reactant concentration and time(half-life), §14-3

questions:

1.Consider the experiment for the reaction, A + 2B ===> C + 2D.

Experiment	Initial [A]	Initial [B]	Rate(Ä[C]/s)
A.	0.0020	0.015	3.0×10^{-4}
B.	0.0050	0.015	3.0×10^{-4}
C.	0.0040	0.045	9.0×10^{-4}

What is the order of reaction with respect to A? with respect to B? overall

2.Consider the reaction, 2NOBr(g) ====> Br_2(g) + 2NO(g), which is 2nd order with respect to NOBr.

If -Ä[NOBr]/s is 3.2×10^{-2} M/s at 10^oC when [NOBr] is 0.20 M:

a. what is the rate of [Br_2] formation in molarity per minute?

b. what is the rate constant at 10^oC in terms of [NOBr]/s?

3.Given the following data for reaction: A + 2B ===> 2C

Experiment	Initial [A]	Initial [B]	Initial rate(Ä[C]/s)
A.	2.00×10^{-4}	3.00×10^{-3}	6.00×10^{-12}
B.	4.00×10^{-4}	9.00×10^{-3}	7.20×10^{-11}
C.	2.00×10^{-4}	9.00×10^{-3}	1.80×10^{-11}
D.	8.00×10^{-4}	9.00×10^{-3}	2.88×10^{-10}

The rate of reaction is given by which of the following?

$k[A]^o[B]^o$	$k[A]^1[B]^o$	$k[A]^2[B]^o$	$k[A]^3[B]^o$
$k[A]^o[B]^1$	$k[A]^1[B]^1$	$k[A]^2[B]^1$	$k[A]^3[B]^1$
$k[A]^o[B]^2$	$k[A]^1[B]^2$	$k[A]^2[B]^2$	$k[A]^3[B]^2$
$k[A]^o[B]^3$	$k[A]^1[B]^3$	$k[A]^2[B]^3$	$k[A]^3[B]^3$

4. Given the following data for the reaction, 2A + B === 2C.

Experiment	Initial [A]	Initial [B]	Ä[C]/s
A.	0.120	0.050	1.20×10^{-5}
B.	0.040	0.050	4.00×10^{-6}
C.	0.040	0.100	8.00×10^{-6}

a. What is the order of the reaction with respect to A? B?

b. What is the value for Ä[B]/s in the reaction for experiment A?

c. What is the value for the specific rate constant for the reaction in terms of C formed?

5.Given the relationship, $\ln([A]_0/[A]) = kt$ for a first order reaction.

a. What is the specific rate constant if the half-life is 80 minutes? Give your answer in s^{-1} units.

b. What is the time required for 90% of A to react if the specific rate constant is 2.0×10^{-5} §[1]

Given the relationship, $\ln([PH_3]_0/[PH_3]) = kt$, for the first order decomposition,

$4PH_3(g) ====> P_4(g) + 6H_2O(g)$. k = 0.0198 §[1]

a. Calculate the half-life for the reaction in seconds.

b. What is the concentration of PH_3 after the reaction has gone for 100 seconds with an initial concentration of 0.20M?