Chapter 20 Worksheet 2

Name: UGA ID:

Instructions:

- Please enter your first and last name as it appears on the eLC roster (do not use a nickname).
- Your UGA myID is a combination of letters and numbers (example: mine is sre13137). **Do not use your 81x number.**
- If you have a printer, print the worksheet, write your answers on the template showing your work where appropriate, convert it to a PDF and Upload this worksheet to Gradescope by 11:59 p.m. on Friday, September 4. You do not need to upload anything to eLC.
- If you do not have a printer, type your answers in the boxes and write your work on separate sheets of paper and convert your work to a PD. Upload the PDF of your work to eLC in the Dropbox. Then upload the worksheet template to Gradescope by 11:59 p.m. on Friday, September 4.

1. What is the correct rate law for the following reaction?

$$CH_3CO_2CH_3(aq) + OH^-(aq) \rightarrow CH_3CO_2^-(aq) + CH_3OH$$

A. Rate = $k[CH_3CO_2CH_3][OH^-]$

B. Rate = $k[CH_3CO_2CH_3]^2[OH]^2$

C. Rate = $k[CH_3CO_2CH_3]^2[OH^-]$

D. Rate = $k[CH_3CO_2CH_3][OH^-]^2$

E. Rate = $k[CH_3CO_2CH_3]^2$

F. Rate = $k[OH^-]^2$

Experiment	$[CH_3CO_2CH_3]$	$[OH^-]$	Rate
1	0.050	0.050	0.00034
2	0.050	0.10	0.00069
3	0.10	0.10	0.00137

2. A particular first order reaction was monitored over a period of time. The figure to the right summarizes the experimental results where each sphere represents 3.0 mol L^{-1}. The average reaction rate is,

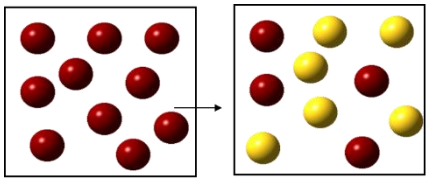
A. 5.0 mol/L·s

B. 1.0 mol/L·s

C. 1.0 s^{-1}

D. 0.20 mol/L·s

E. 0.20 s^{-1}



time, t =0 time, t =1 min 30 s

3. The decomposition of ammonia on a metal surface to form nitrogen gas and hydrogen gas is a zero-order reaction. At 873 °C, the value of the rate constant is 1.5×10^{-3} mol/L·sec. Determine the number of minutes needed to decompose 90.0% of the ammonia in a solution containing 1.00 grams of ammonia in a 250 mL flask.

4. Data for the reaction A + B → C are given below. Find the rate constant for this system.

Experiment	$[A]_0$, M	$[B]_0$, M	Initial rate, M/s
1	0.030	0.060	2.5×10^{-5}
2	0.030	0.020	2.5×10^{-5}
3	0.060	0.060	10.0×10^{-5}

A. $2.8 \times 10^{-2}\ M^{-1}\ s^{-1}$
B. $2.8 \times 10^{-2}\ M\ s^{-1}$
C. $2.8 \times 10^{-2}\ M^{2}\ s^{-1}$
D. $1.7 \times 10^{-3}\ M^{-1}\ s^{-1}$
E. $1.7 \times 10^{-3}\ M\ s^{-1}$

5. The reaction A (aq) → B (aq) is first order in [A]. A solution is prepared with [A] = 1.22 M. The following data are obtained as the reaction proceeds:

Time (s)	0.0	6.0	12.0	18.0
[A] (M)	1.22	0.61	0.31	0.15

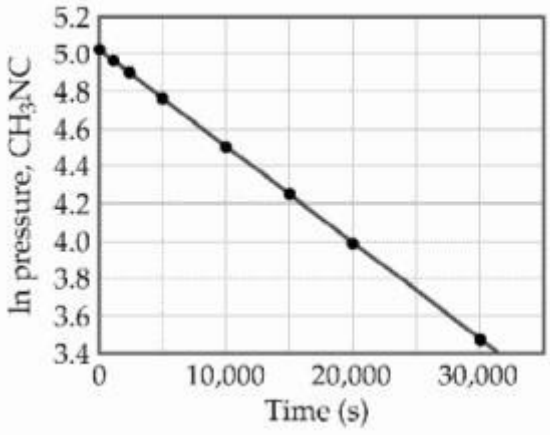
What is the rate constant for this reaction? (include units in the answer)

6. At elevated temperatures, methylisonitrile (CH_3NC) isomerizes to acetonitrile (CH_3CN):

$CH_3NC\ (g) \rightarrow CH_3CN\ (g)$

The reaction is first order in methylisonitrile. The attached graph shows data for the reaction obtained at 198.9 °C. What is the rate constant (s^{-1}) for the reaction?

A. -1.9×10^{4}
B. $+5.2 \times 10^{-5}$
C. $+1.9 \times 10^{4}$
D. -5.2×10^{-5}
E. +6.2

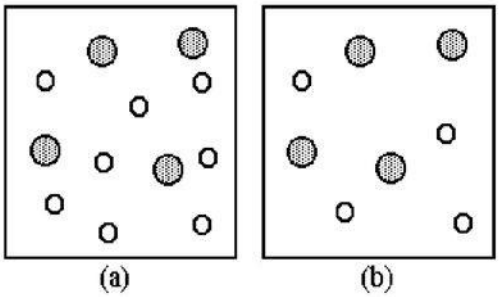


7. The following reaction is first order in A and first order in B:

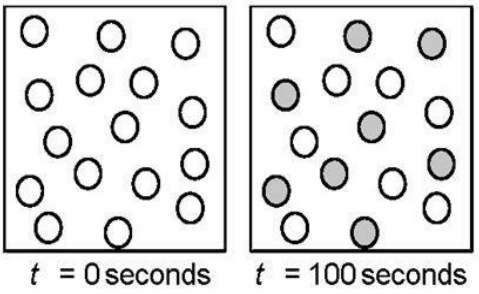
A + B → Products Rate = k[A][B]

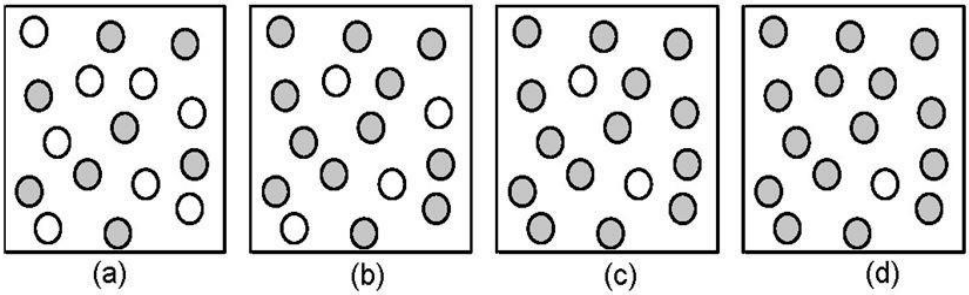
What is the initial rate of this reaction in vessel (b) relative to the initial rate of this reaction in vessel (a)? Each vessel has the same volume. Shaded spheres represent A molecules, and unshaded spheres represent B molecules present at the beginning of the reaction.

A. rate in vessel (b)/rate in vessel (a) = 1:2
B. rate in vessel (b)/rate in vessel (a) = 1:1
C. rate in vessel (b)/rate in vessel (a) = 2:1
D. rate in vessel (b)/rate in vessel (a) = 4:1



8. Consider the first-order reaction A → B in which A molecules (unshaded spheres) are converted to B molecules (shaded spheres). Given the following pictures at t = 0 seconds and t = 100 seconds, which picture represents the number of A and B molecules remaining at 300 seconds?





9. The following set of data was obtained by the method of initial rates for the reaction:

$S_2O_8^{2-}(aq) + 3\ I^-(aq) \rightarrow 2\ SO_4^{2-}(aq) + I_3^-(aq)$

What is the rate law for the reaction?

Expt	$[S_2O_8^{2-}]$ (M)	$[I^-]$ (M)	Initial Rate ($M\,s^{-1}$)
1	0.25	0.10	9.00×10^{-3}
2	0.10	0.10	3.60×10^{-3}
3	0.20	0.30	2.16×10^{-2}