CH142 Exam 1
Spring 2019
Answer Key

1. *C*
2. *B*
3. *C*
4. *D*
5. *A*
6. *D*
7. *A*
8. *C*
9. *E*
10. *C*

11.

A) more blue (Cl^- is a reactant; shifts right)

B) more pink (endothermic reaction, so heat is like a reactant)

C) remains purple (only gaseous reactions are affected by container size)

D) remains purple (catalysts don't affect the position of the equilibrium)

E) more pink (this removes a reactant; shifts left)

12. $K = [NO_2]^2/[N_2O_4] = 4.0 \times 10^{-7}$

Need an ICE table.

	$[N_2O_4]$	$[NO_2]$
I	*0.1 M*	*0*
C	*-x*	*+2x*
E	*0.1 -x*	*2x*

$K = [2x]^2/[0.1 - x] = 4.0 \times 10^{-7}$

Easiest way to solve is to ignore x in the denominator.

$K = [2x]^2/[0.1] = 4.0 \times 10^{-7}$

$x = 1 \times 10^{-4}$ *M, but* $[NO_2] = 2x$.

$[NO_2] = 2.0 \times 10^{-4}$ M

13. *Again, need an ICE table. Bold is what we are given, red is what we infer.*

	$[PCl_5]$	$[PCl_3]$	$[Cl_2]$
I	***8.7×10^{-3} M***	***0.298 M***	***0***
C	*-2×10^{-3} M*	*$+2 \times 10^{-3}$ M*	*$+2 \times 10^{-3}$ M*
E	*6.7×10^{-3} M*	*0.3 M*	***2×10^{-3} M***

$K = [Cl_2][PCl_3]/[PCl_5] = (2 \times 10^{-3})\ (0.3)/\ (6.7 \times 10^{-3}) =$ ***0.0896***

14. *500 μL = 0.5 mL*
0.5 mL/3 mL x 1.00 x 10^{-3} M = ***1.67 x 10^{-4}M***

15. *a) rate = k $[ClO_2]^2[OH^-]$*

b) Use any of the data sets. For example,

0.0248 M/s = k $(0.06)^2(0.030)$

k= 230 $M^{-2}s^{-1}$

16. *a) $t_{1/2}$ = 0.693/k*

k = 30 s

b) ln X = -kt + ln X_o

ln X = -0.023 s^{-1} x 180 s + ln (0.4)

ln X = -5.1

X = ***0.0064 M***

17. A) b
B) a
C) 1-d; 2-c; 3-a; 4-b

18.

$$\frac{k_c}{k_u} = \frac{Ae^{-E_{ac}/RT}}{Ae^{-E_{au}/RT}} = e^{(E_{au}-E_{ac})/RT} = e^{(17.7\times10^3 J/mol - 2.2\times10^3 J/mol)/(8.314\ J/molK\ \times 200\ K)} = \mathbf{11000}$$