Dougherty Valley HS Chemistry - AP
Kinetics – Extra Practice

Name: | **Period:** | **Seat#:**

Directions: Any worksheet that is labeled with an * means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn't do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website…and the entire internet! See me if you need help finding practice on a topic you are struggling with.

1) For a particular reaction at constant temperature,
A(g) + 2 B(g) ---> products
What is the value of "?" in this table? _____

Run	Initial [A]	Initial [B]	Initial Rate
1	1	1	1
2	2	4	8
3	3	9	27
4	4	2	?

2) What is a rate law? What is the proportionality constant called?

3) What is meant by the order of a reaction?

4) The rate law for the reaction $2 NO + O_2 \rightarrow 2 NO_2$ is Rate= $k[NO]^2[O2]$. At 25°C, k=$7.1E^9$ L mol-2s^{-1}. What is the rate of reaction when [NO] = 0.0010 mol/L and [O$_2$]=0.034 mol/L?

5) The initial rate of the reaction:

$$BrO_3^- (aq) + 5 Br^- (aq) + 8 H^+(aq) ----> 3 Br_2(l) + H_2O(l)$$

Has been measured at the reactant concentrations shown (in mol/L):

Exp.	[BrO$_3^-$]	[Br$^-$]	[H$^+$]	Initial Rate (mol L^{-1})
1	0.10	0.10	0.10	$8.0E^{-4}$
2	0.20	0.10	0.10	$1.6E^{-3}$
3	0.10	0.20	0.10	$1.6E^{-3}$
4	0.10	0.10	0.20	$3.2E^{-3}$

According to these results what would be the initial rate (in mol/Ls) if all three [ ] are: [**BrO$_3^-$**] = [**Br$^-$**] = [**H$^+$**] = 0.20 M?

6) The reaction of iodide ion with hypochlorite ion, OCl- (which is found in liquid bleach), follows the equation

$$OCl^- + I^- ----> OI^- + Cl^-$$
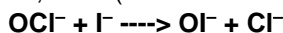
It is a rapid reaction that gives the following rate data.

Initial [OCl$^-$]	Initial [I$^-$]	Rate of Formation of Cl$^-$ (Ms^{-1})
$1.7E^{-3}$	$1.7E^{-3}$	$1.75E^4$
$3.4E^{-3}$	$1.7E^{-3}$	$3.50E^4$
$1.7E^{-3}$	$3.4E^{-3}$	$3.50E^4$

What is the rate law for the reaction, Determine the value of the rate constant

7) The decomposition of ozone, O$_3$, is believed to occur by the two-step mechanism below. If this is the mechanism, what is the reaction's rate law?

O$_3$ -----> O$_2$ + O (slow)
O + O$_3$ -----> 2 O$_2$ (fast)
_____
2 O$_3$ -----> 3 O$_2$ (net reaction)
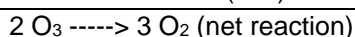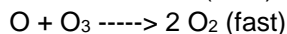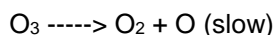
8) Write expressions for the rate of formation of the product(s) in each of the following. Indicate the units of the rate constant. Assume single step
a) $H_2 + Cl_2 \longrightarrow 2\ HCl$
b) $2\ O_2 + S_2 \longrightarrow 2\ SO_2$
c) $3\ O \longrightarrow O_3$
d) $2\ HI + Cl_2 \longrightarrow 2\ HCl + I_2$
e) $C_6H_6 + Cl_2 \longrightarrow C_6H_5Cl + HCl$

9) What is a homogeneous catalyst? How does it function, in general terms?

10) What is a heterogeneous catalyst? How does it function?

11) Consider the decomposition of dinitrogen pentoxide: $2\ N_2O_5\ (g) \longrightarrow 4\ NO_2(g) + O_2(g)$

Given that the initial concentration of N_2O_5 is 2a mol/L, which line in the graph shows the concentration of $O_2(g)$ as a function of time?
a) Line A, starts at 4a and ends near zero
b) Line B, starts at zero and ends near 4a
c) Line C, starts at zero and ends near 2a
d) Line D, starts at zero and ends near a.
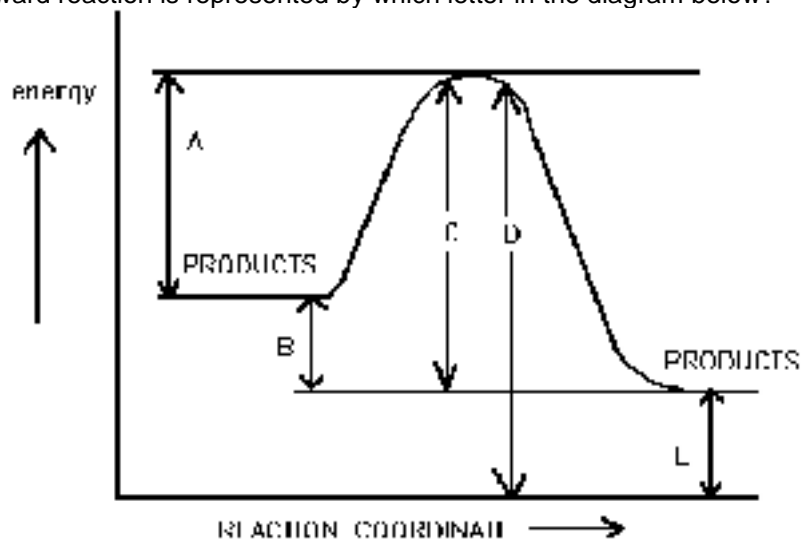e) Line E, starts at 2a and ends near zero
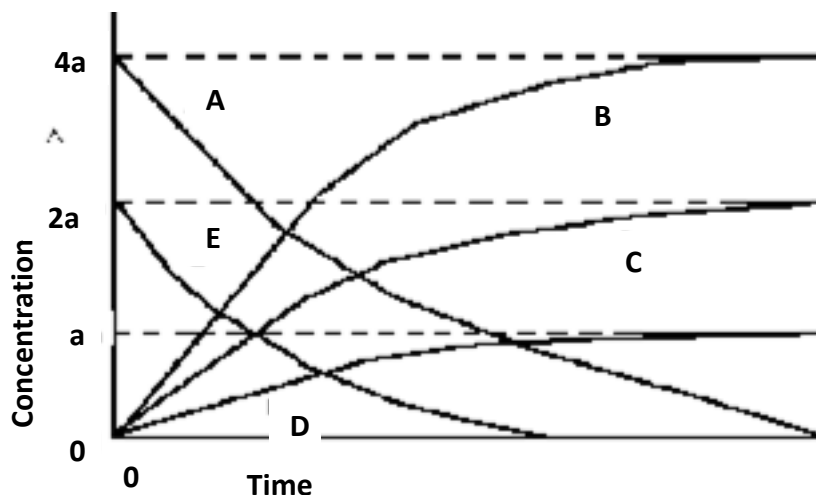
12) Given the reaction: **A + B ---> C + D**
The reaction will most likely occur at the greatest rate if A and B represent
a) a. nonpolar molecular compounds in the solid phase
b) b. ionic compounds in the solid phase
c) c. solutions of nonpolar molecular compounds
d) d. solutions of ionic compounds

13) The value for the energy of activation of the forward reaction is represented by which letter in the diagram below?
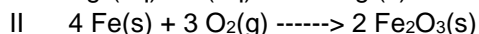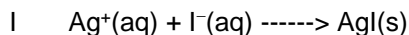a) A
b) B
c) C
d) D
e) E

14) Consider the following reactions:

         I $Ag^+(aq) + I^-(aq)$ ------> $AgI(s)$

        II $4\ Fe(s) + 3\ O_2(g)$ ------> $2\ Fe_2O_3(s)$

Which one of the following statements best described the relative rates of the two reactions? Explain why

a) a. II is faster than I
b) b. I and II are both slow
c) c. I and II are both fast
d) d. I is faster than II

15) Persons who have been submerged in very cold water and who are believed to have drowned sometimes can be revived. On the other hand, persons who have been submerged in warmer water for the same length of time have died. Explain this in terms of factors that affect the rates of chemical reactions.

16 a) What is meant by the order of a reaction?
   b) Can the order be determined from the equation for the overall reaction?
   c) If the sum of the coefficients of the reactants in the equation equals the total order of a reaction,
      can it be assumed that the equation represents an elementary process?

17) The rate of the chemical reaction between substances A and B is found to follow the equation:

$$Rate= k[A]^2[B]$$

where k is a constant. If the concentration of A is halved, what should be done to the concentration of B to make the reaction go to 75% of its former rate?

a) The concentration of B should be kept constant
b) The concentration of B should be doubled
c) The concentration of B should be tripled
d) The concentration of B should be halved
e) The concentration of B should be multiplied by 4/3

18) If doubling the pressure doubles the number of collisions in a sample of gas, one expects the number of productive collisions leading to a chemical reaction to be:

a) unchanged
b) halved
c) doubled
d) more than halved
e) more than doubled