Multiple Choice Response Sheet

Name:_____

1. A
2. C
3. B
4. C
5. B
6. A
7. A
8. A
9. D
10. B
11. D
12. D
13. C
14. D
15. A
16. C
17. C
18. A
19. C
20. B
21. C
22. D
23. D
24. D
25. A
26. D
27. _____
28. _____
29. _____
30. _____
31. _____
32. _____
33. _____
34. _____
35. _____
36. _____

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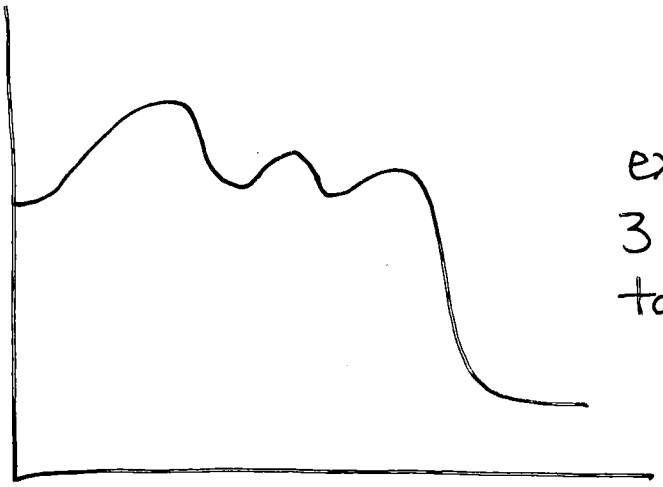
Kinetics

1. a) $\text{Rate} = \frac{\Delta \text{ amt}}{\Delta \text{ time}}$

$= \frac{1.0 \times 10^{-2} \text{ mol}}{115 \text{ sec.}} = 8.7 \times 10^{-5} \text{ mol/sec}$

b) The increase in temperature serves to provide the particles with more energy (kinetic). Now a greater fraction of particles will have the same amount or more energy than is required to form the activated complex.

2. $4HBr + O_2 \rightarrow 2H_2O + 2Br_2$ (1)



exothermic (1)
3 hills (1)
tallest hill @ 1st step (1)

3 a) $Cl_2 \rightarrow Cl + Cl$ (or $Cl_2 \rightarrow 2Cl$)

b) $H \overset{1}{\leftrightarrows} Cl$

Multiple Choice Response Sheet

Name:_____

1. D
2. A
3. B
4. A
5. D
6. D
7. D
8. C
9. D
10. D
11. C
12. D
13. C
14. D
15. A
16. A
17. C
18. C
19. B
20. D
21. C
22. A
23. B
24. B
25. D
26. _____
27. _____
28. _____
29. _____
30. _____
31. _____
32. _____
33. _____
34. _____
35. _____
36. _____

37

Take Home Practice

1. a) $\text{Rate} = \frac{\Delta \text{amount}}{\Delta \text{time}} = \frac{(77.6 - 40.9)\text{mL}}{(40.0 - 20.0)\text{ sec}}$

$= \frac{36.7\text{ mL}}{20.0\text{ sec}} = 1.835\ldots \text{ mL/sec}.$

$\text{Rate} = 1.84\text{ mL/sec}$

b) The rate starts fast then slows down. This is because reactant particles get used up. As fewer reactant particles are available, there are fewer collisions. A smaller # of collisions leads to a decreased chance that there will be collisions leading to products.

2. a) $CO + O_2 + NO \rightarrow CO_2 + NO_2$

b) $H \overset{1}{\underset{1}{\Sigma}} HOO$

c) OH

3. $4HBr + O_2 \rightarrow 2H_2O + 2Br_2$

Multiple Choice Response Sheet

Name: _____

1. C
2. A
3. D
4. A
5. D
6. A
7. B
8. A
9. B
10. D
11. A
12. C
13. C
14. D
15. D
16. B
17. D
18. C
19. C
20. B
21. C
22. D
23. C
24. A
25. B
26. B
27. D
28. _____
29. _____
30. _____
31. _____
32. _____
33. _____
34. _____
35. _____
36. _____

37

Kinetics

1. * the Δ amount is of the <u>whole</u> <u>flask</u> ∴ the loss in mass is because of $CO_{2(g)}$

$$\text{Rate} = \frac{\Delta \text{ amount } (CO_2)}{\Delta \text{ time}}$$

$$= \frac{(203.00 - 202.92)\text{g}}{1.5 \text{ min}} = \frac{0.08 \text{ g}}{1.5 \text{ min}} \quad * \text{ 1 S.F.}$$

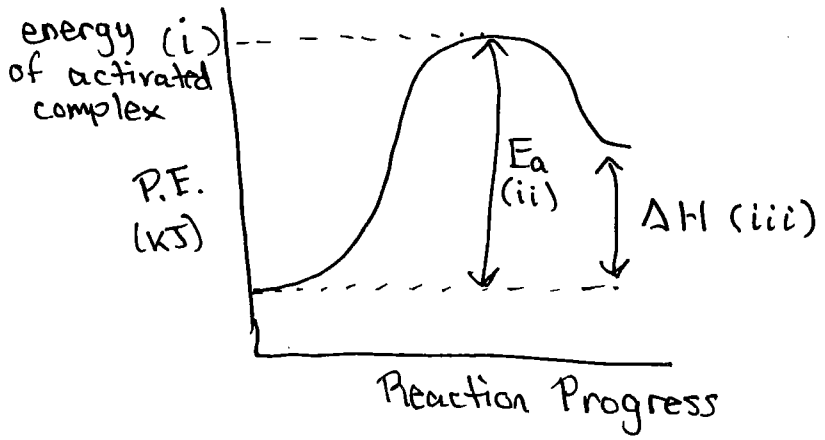
$$= 0.05 \text{ g/min } CO_2$$

$NaHCO_3$

$$0.05 \frac{\text{g } CO_2}{\text{min}} \times \frac{1 \text{ mol } CO_2}{44.0 \text{ g } CO_2} \times \frac{1 \text{ mol } NaHCO_3}{1 \text{ mol } CO_2} \times \frac{84.0 \text{ g } NaHCO_3}{1 \text{ mol } NaHCO_3}$$

$$= 0.1 \text{ g/min } NaHCO_3$$

2.



3. a) Step 1 $NO + Pt \rightarrow$ **$NOPt$**

Step 2 $NOPt + NO \rightarrow$ **N_2** + **O_2Pt**

b) a substance that is created in one step of a reaction mechanism and used up in a <u>later</u> step.

Example: O_2Pt <u>or</u> $NOPt$

3. a) disagree

b) $Q = \frac{[CO][H_2]}{[H_2O]}$

$= \frac{(0.25M)(0.20M)}{(0.15M)} = 0.333$

$Q < K_{eq}$ ∴ the reaction will go right which increases $[CO]$

4. $K_{eq} = \frac{[HI]^2}{[H_2][I_2]} = 64$

	H_2	+	I_2	⇌	$2HI$
I	x		x		0
C	-0.08		-0.08		$+0.160$
E	$x-0.08$		$x-0.08$		0.160

$\sqrt{\frac{(0.160)^2}{(x-0.080)}} = \sqrt{64}$

$8x - 0.64 = 0.160$

$x = [H_2]_{initial} = 0.10M$

Multiple Choice Response Sheet

Name: _____

1. D
2. C
3. B
4. D
5. A
6. D
7. C
8. D
9. C
10. B
11. C
12. C
13. C
14. D
15. D
16. C
17. B
18. A
19. D
20. A
21. D
22. C
23. D
24. A
25. D
26. _____
27. _____
28. _____
29. _____
30. _____
31. _____
32. _____
33. _____
34. _____
35. _____
36. _____

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Kinetics

1. a) $\text{Rate} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{(60-25)\text{mL}}{(2.5-1.0)\text{min}} = \frac{35\text{mL}}{1.5\text{min}} = 23\text{mL/min}$

$\text{Rate} = \frac{(45-10)\text{mL}}{(4.0-0.8)\text{min}} = \frac{35\text{mL}}{3.2\text{min}} = 11\text{mL/min}$

b) Temperature may have been lowered for experiment #2. This would mean that the particles have less K.E. on average. Fewer particles would be colliding with sufficient K.E. to surpass the activation energy or minimum threshold energy. for the reaction

(or [bleach] was decreased → fewer collisions = decreased chance of collisions with sufficient energy and correct orientation

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2. a) Method 1: mass of $Na_{(s)}$; mass of system (open system); volume of $H_{2(g)}$ (closed system)

Method 2: temperature; pH; pressure (closed system).

b) low; Since the reaction is immediate and violent (ie: fast), it indicates that most particle collisions are successful and have sufficient energy even at room temperature. Since room temperature represents quite a lower K.E., the "sufficient energy" must be low as well.

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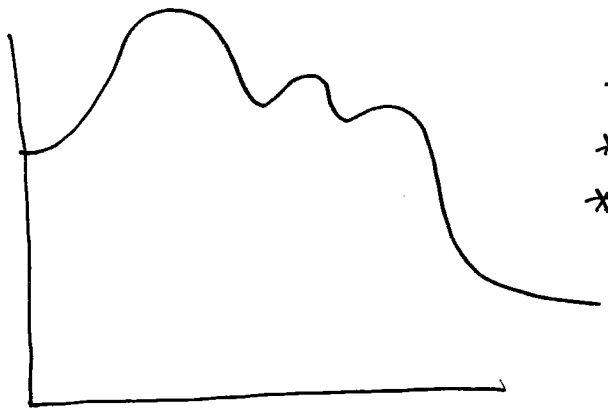
3. $4HBr + O_2 \rightarrow 2H_2O + 2Br_2$



* exothermic
* 3 hills
* 1st hill is tallest.