

Name: _____

Partner(s): _____

Lab: Changes (Midterm Prep)

Purpose: To describe reactions in terms of the type of change they undergo, the type of reaction (if a chemical change is observed), reduction-oxidation, energy, and kinetics.

Overview: In this lab, you will perform 3-5 changes. Your teacher will tell you which changes your group will perform. **Write those change numbers HERE:** _____
You will be given general instructions for the lab, but you must make sure to carefully read the step-by-step instructions for each procedure BEFORE you do it. If you have any questions about what you are doing, ASK BEFORE you begin.

Safety: **GOGGLES....ALWAYS.....NO EXCEPTIONS!!!**
Inappropriate behavior will result in your ejection from the lab AND a ZERO.

The changes you will conduct:

NOTE: *For EACH change, you will need to determine if it is exothermic or endothermic! Make sure to make the proper observations that would allow you to determine this.*

Change #1 – Make a solution of ammonium nitrate.

Change #2 – React aluminum and copper (II) chloride to yield copper and aluminum chloride.

Change #3 – Magnesium metal reacts with oxygen gas to form magnesium oxide and a bright, white light.

Change #4 – Hydrogen peroxide can be broken down into liquid water and gaseous oxygen using potassium iodide as a catalyst.

Change #5 – A solution of magnesium sulfate is reacted with sodium carbonate solution to form magnesium carbonate and sodium sulfate.

Scoring:

You will be scored out of 10 points for each change analysis. Each analysis requires 13 tasks.

The following rubric will be used to grade your lab:

Change #	Equation (Topic 1)	Change Type (Topic 1)	Redox (Topic 3)	Rxn Type (Topic 7)	Energy (Topics 4 & 5)	Kinetics (Topic 2)	Neatness & Readability, Lab Behavior, & Clean Up	SCORE (0-10)
#1								
#2								
#3								
#4								
#5								

Change Analysis Template

Change #1

1. Change Description in Words:

Ammonium nitrate is dissolved in water.

2. Change Description in Chemical Equation Form: (include phases and balance it using coefficients)

→

3. Type of Change Description:

a) What type of change is this? (Chemical or Physical?) _____

b) Explain your reasoning.

4. Red-ox Description:

a) Assign oxidation numbers to each type of atom in your chemical equation above. Write them above the symbol for each atom.

b) **IF** the process observed is a red-ox reaction, then circle the species reduced, and put a square around the species oxidized.

c) **IF** the process observed is a red-ox reaction, explain how charge was conserved.
(OR explain using half-reactions if you know how to write them!)

5. Type of Reaction Description:

IF the change is chemical, what type of reaction was it? _____

6. Energy Description:

a) Is the process endothermic or exothermic? _____

b) Explain your reasoning.

c) Draw a PE Diagram consistent with your observation in Part a).

Label PE of reactants, E of activation, Change in E (ΔH), and PE of products.

d) Does the process result in an increase or decrease in entropy? _____

e) Explain your reasoning.

7. Kinetics Description:

List 2 changes in variables that could increase the rate of **THIS PARTICULAR PROCESS:**

1. _____

2. _____

Change Analysis Template

Change #2

1. Change Description in Words:

Aluminum reacts with a solution of copper (II) chloride to yield solid copper and a solution of aluminum chloride.

2. Change Description in Chemical Equation Form: (include phases and balance it using coefficients)

→

3. Type of Change Description:

BOTH types of change occur in this experiment. Which change is physical and which is chemical? Give the observations/experimental evidence that allows you to distinguish one change as physical and the other as chemical.

4. Red-ox Description:

- Assign oxidation numbers to each type of atom in your chemical equation above. Write them above the symbol for each atom.
- IF** the process observed is a red-ox reaction, then circle the species reduced, and put a square around the species oxidized.
- IF** the process observed is a red-ox reaction, explain how charge was conserved.
(OR explain using half-reactions if you know how to write them!)

5. Type of Reaction Description:

IF the change is chemical, what type of reaction was it? _____

6. Energy Description:

- Is the process endothermic or exothermic? _____
- Explain your reasoning. _____

c) Draw a PE Diagram consistent with your observation in Part a).
Label PE of reactants, E of activation, Change in E (ΔH), and PE of products.

- Does the process result in an increase or decrease in entropy? _____
- Explain your reasoning. _____

7. Kinetics Description:

List 2 changes in variables that could increase the rate of **THIS PARTICULAR PROCESS:**

- _____
- _____

1. Change Description in Words:

Magnesium metal reacts with oxygen gas to form magnesium oxide and a bright, white light.

2. Change Description in Chemical Equation Form: (include phases and balance it using coefficients)

→

3. Type of Change Description:

a) What type of change is this? (Chemical or Physical?) _____

b) Explain your reasoning.

4. Red-ox Description:

a) Assign oxidation numbers to each type of atom in your chemical equation above. Write them above the symbol for each atom.

b) **IF** the process observed is a red-ox reaction, then circle the species reduced, and put a square around the species oxidized.

c) **IF** the process observed is a red-ox reaction, explain how charge was conserved.
(OR explain using half-reactions if you know how to write them!)

5. Type of Reaction Description:

IF the change is chemical, what type of reaction was it? _____

6. Energy Description:

a) Is the process endothermic or exothermic? _____

b) Explain your reasoning.

c) Draw a PE Diagram consistent with your observation in Part a).

Label PE of reactants, E of activation, Change in E (ΔH), and PE of products.

d) Does the process result in an increase or decrease in entropy? _____

e) Explain your reasoning.

7. Kinetics Description:

List 2 changes in variables that could increase the rate of **THIS PARTICULAR PROCESS:**

1. _____

2. _____

1. Change Description in Words:

Hydrogen peroxide can be broken down into liquid water and gaseous oxygen using potassium iodide as a catalyst.

2. Change Description in Chemical Equation Form: (include phases and balance it using coefficients)

→

3. Type of Change Description:

- a) What type of change is this? (Chemical or Physical?) _____
- b) Explain your reasoning.

4. Red-ox Description:

- a) Assign oxidation numbers to each type of atom in your chemical equation above. Write them above the symbol for each atom.
- b) **IF** the process observed is a red-ox reaction, then circle the species reduced, and put a square around the species oxidized.
- c) **IF** the process observed is a red-ox reaction, explain how charge was conserved.
(OR explain using half-reactions if you know how to write them!)

5. Type of Reaction Description:

IF the change is chemical, what type of reaction was it? _____

6. Energy Description:

- a) Is the process endothermic or exothermic? _____
- b) Explain your reasoning.

- c) Draw a PE Diagram consistent with your observation in Part a).
Label PE of reactants, E of activation, Change in E (ΔH), and PE of products.
What does the addition of potassium iodide do to the diagram, compared to if it were not used?

- d) Does the process result in an increase or decrease in entropy? _____
- e) Explain your reasoning.

7. Kinetics Description:

List 2 changes in variables that could increase the rate of **THIS PARTICULAR PROCESS:**

- 1. _____
- 2. _____

1. Change Description in Words:

A solution of magnesium sulfate is reacted with sodium carbonate solution to form magnesium carbonate and sodium sulfate.

2. Change Description in Chemical Equation Form: (include phases and balance it using coefficients)

USE TABLE F TO HELP YOU WITH YOUR PRODUCT PHASES!!

→

3. Type of Change Description:

- a) What type of change is this? (Chemical or Physical?) _____
b) Explain your reasoning.

4. Red-ox Description:

- a) Assign oxidation numbers to each type of atom in your chemical equation above. Write them above the symbol for each atom.
b) **IF** the process observed is a red-ox reaction, then circle the species reduced, and put a square around the species oxidized.
c) **IF** the process observed is a red-ox reaction, explain how charge was conserved.
(OR explain using half-reactions if you know how to write them!)

5. Type of Reaction Description:

IF the change is chemical, what type of reaction was it? _____

6. Energy Description:

- a) Is the process endothermic or exothermic? _____
b) Explain your reasoning.

c) Draw a PE Diagram consistent with your observation in Part a).
Label PE of reactants, E of activation, Change in E (ΔH), and PE of products.

- d) Does the process result in an increase or decrease in entropy? _____
e) Explain your reasoning.

7. Kinetics Description:

List 2 changes in variables that could increase the rate of **THIS PARTICULAR PROCESS:**

1. _____
2. _____

For Teacher Use Only:

Minutes _____

Approved _____

Name: _____

Lab: Changes
Lab Credit Sheet

Answer the following questions with thoughtful, detailed answers in complete sentences. Cite specific examples from your observations and results of the lab activity.

1. Explain the difference between a physical and a chemical change. Which of the changes you performed were physical? Which were chemical? How do you know?
2. Explain how the changes you performed showed Conservation of Mass.
3. Explain the changes you performed showed Conservation of Charge.
4. Explain the changes you performed showed Conservation of Energy.
5. Distinguish between potential energy and kinetic energy, and explain how you can tell the difference in a chemical reaction.