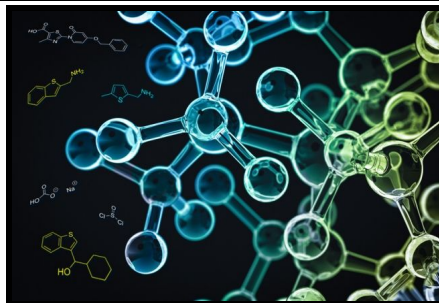


# Science

## Module 3 Chemical Reactions

### Chapter 2 Describing Chemical Reactions

*What happened to the potassium chlorate during our chemical reaction?*



## Lessons & Objectives

### Lesson 1:

- ☐ **I can...** describe what is occurring during a decomposition reaction and relate it to our experiment.

### Lesson 2:

- ☐ **I can...** determine the products of our decomposition reaction.

### Lesson 3:

- ☐ **I can...** understand the Law of Conservation of Mass and apply it to our chemical reaction.

## Packet Completion Rubric

4	3	2	1	0
Nothing in packet is missing. Responses consistently meet ALL of the criteria for high quality work. Exemplary effort is evident throughout the entire packet.	Packet is 75-100% complete/accurate. Work/effort misses the criterion for high quality consistently.	Packet is 50-75% complete/accurate. Work/effort has evidence of quality but not consistently.	More than 50% of the packet is incomplete or incorrect. Work does not meet the expected level of quality.	Packet is entirely incomplete or not turned in.

Grading Breakdown:

0 - 1.9 = F

2 - 2.4 = D

2.5 - 2.9 = C

3 - 3.4 = B

3.5 - 4 = A

***"Chemistry itself knows altogether too well that - given the real fear that the scarcity of global resources and energy might threaten the unity of mankind - chemistry is in a position to make a contribution towards securing a true peace on earth."***

**Kenichi Fukui (Nobel Prize in Chemistry, 1981)**

## Lesson 1

- ❑ **I can...** describe what is occurring during a decomposition reaction and relate it to our experiment.

### Do Now

Would the same reaction occur if we did not heat the Potassium Chlorate before adding the gummy bear? Answer yes or no, and WHY you think this.

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### Phase Change Review

1) What happens to the freedom of movement of molecules when heat energy is applied?

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2) What then happens to the kinetic energy of the molecules?

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3) How does this impact the strength of attraction between atoms that compose a molecule?

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## Review: Phase Change!

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### Key Vocabulary

Decomposition Reaction:

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Product:

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Reactant:

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### Decomposition Reaction Video Notes:

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### Exit Slip

In the article you read, potassium chloride broke down into 2 products: potassium and chlorine, as shown by this reaction:  $2 \text{KCl} \rightarrow 2 \text{K} + \text{Cl}_2$

In the reaction we did in the auditorium, we used Potassium Chlorate. The chemical formula is  $\text{KClO}_3$ . If we know that this also broke down into *only 2 products*, what do you think those two products are?



## Lesson 2

❑ I can... determine the products of our decomposition reaction.

### Do Now

Look back at your exit slip from lesson 1, what do you hypothesize the products were for the decomposition of Potassium Chlorate? Compare your answer to your partner's, and explain how and why you arrived at your answer.

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### Video Notes

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In your own words, what is a combustion reaction?

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What reactant to you NEED for a combustion reaction to occur?

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### Key Vocabulary

Combustion reaction:

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Exothermic Reaction:

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Endothermic Reaction:

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## Discussion

What observations from the auditorium indicate that our reaction was a combustion reaction?

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_
- 5) \_\_\_\_\_

What reactant is NEEDED for a combustion reaction to occur? \_\_\_\_\_

## Our Reaction

If \_\_\_\_\_ is needed for a combustion reaction to occur, then it must be one of our products. Using that information, revise your hypothesis and determine- with your partner- what you think the two products must be.



# Chemical Decomposition Reaction

## Overview of a Chemical Decomposition or Analysis Reaction

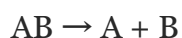
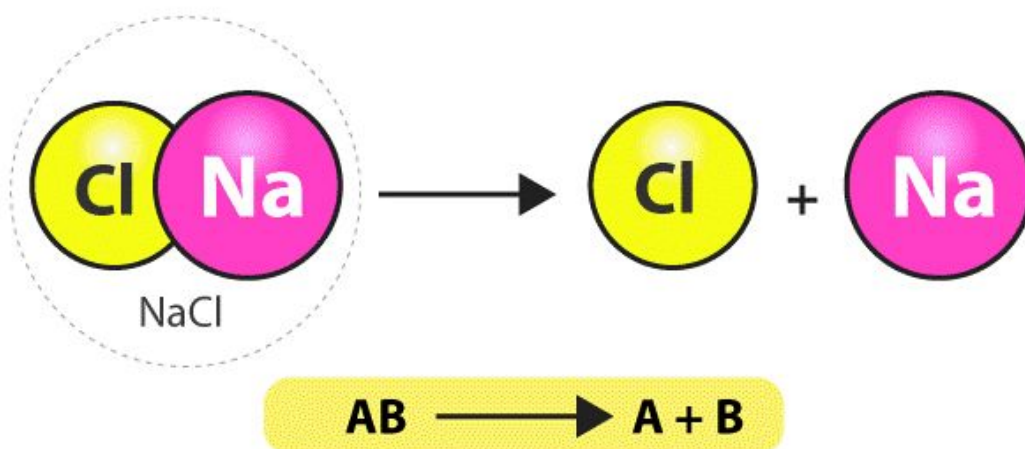
In a decomposition reaction, compounds are broken into simpler forms.

By Anne Marie Helmenstine, Ph.D.

Updated March 06, 2017



A chemical decomposition reaction or analysis reaction is one of the most common types of chemical reactions. In a decomposition reaction, a compound is broken into smaller chemical parts.



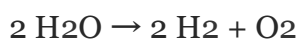
In some cases, the reactant breaks into its component elements, but a decomposition may involve breakdown into any smaller molecules. The process may occur in a single step or multiple ones.

Because chemical bonds are broken, a decomposition reaction requires the addition of energy to begin. Usually the energy is supplied as heat, but sometimes simply a mechanical bump, electric shock, radiation, or change in humidity or acidity initiates the process. The reactions may be classified on this basis as thermal decomposition reactions, electrolytic decomposition reactions, and catalytic reactions.

A decomposition is the opposite or reverse process of a synthesis reaction.

## Decomposition Reaction Examples

The electrolysis of water into oxygen and hydrogen gas is an example of a decomposition reaction:



Another example is the decomposition of potassium chloride into potassium and chlorine gas.



## Uses of Decomposition Reactions

Decomposition reactions are also called analysis reactions because they are extremely valuable in analytical techniques. Examples include mass spectrometry, gravimetric analysis, and thermogravimetric analysis.

## Exit Slip

Could the following decomposition of potassium chlorate cause a combustion reaction? Why or why not?



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## Lesson 3

☐ **I can...** understand the Law of Conservation of Mass and apply it to our chemical reaction.

## Do Now

- 1) Take a piece of paper from the pile and crumple it up.
- 2) Now toss it into the bin at the front of the room.
- 3) Does the pile of uncrumpled paper have more, less, or equal mass to the pile of crumpled paper? Why do you think so? Explain in complete sentences below.

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## Video Notes

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## Key Vocabulary

Law of Conservation of Mass:

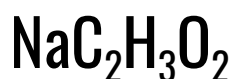
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## Counting Atoms

### Video Notes:

- A (1) \_\_\_\_\_ applies only to the atom that it is behind
- The (2) \_\_\_\_\_ apply to the entire compound.
- You \_\_\_\_\_ the (1) and the (2)
- Subscripts after a parenthesis apply to \_\_\_\_\_



How many....

Sodium atoms? \_\_\_\_\_

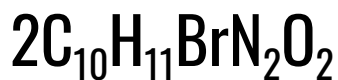
Carbon atoms? \_\_\_\_\_

Hydrogen atoms? \_\_\_\_\_

Oxygen atoms? \_\_\_\_\_

**Total atoms:** \_\_\_\_\_

Element abbreviations always start with a \_\_\_\_\_



How many....

Carbon atoms? \_\_\_\_\_

Hydrogen atoms? \_\_\_\_\_

Bromine atoms? \_\_\_\_\_

Nitrogen atoms? \_\_\_\_\_

Oxygen atoms? \_\_\_\_\_

**Total atoms:** \_\_\_\_\_

Extra notes:

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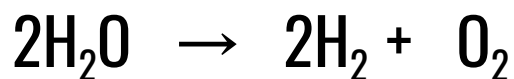
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## LETS TRY A FULL REACTION!



How many atoms did we start with? \_\_\_\_\_

- Don't forget to distribute the "2" and multiply the coefficient and subscript

How many atoms did we end with? \_\_\_\_\_

- Count the number of hydrogen atoms and add it to the number of oxygen atoms

What did you notice about the number of atoms on both sides? How does the Law of Conservation of Mass apply to this formula?

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### Exit Slip

Consider our decomposition reaction:



How many atoms did we start with? \_\_\_\_\_

How many atoms did we end with? \_\_\_\_\_

How does the Law of Conservation of Mass apply to our reaction?

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