

# DynaNotes Grade 8 Science Alignment to TEKS/Student Expectations

## Example: "Chemical Equations" Section

### Student Expectation:

**8.5 (F)** Matter and energy. The student knows that matter is composed of atoms and has chemical and physical properties. The student is expected to recognize whether a chemical equation containing coefficients is balanced or not and how that relates to the law of conservation of mass.

- (i) recognize whether a chemical equation containing coefficients is balanced or not
- (ii) recognize how [a balanced chemical equation] relates to the law of conservation of mass

*Breakouts*

### How DynaNotes are Helpful:

First, view the DynaNotes Quick Start Guide. Key takeaways are that DynaNotes student course notes ...

- ... are a supplement to, not a replacement for, your current quality instructional practices.
- ... are intended to initially be used as *scaffolding* to enable or speed understanding, retention, recall, application work completion, etc.
- ... are, secondarily, helpful for measuring and communicating student progress and also as a communication tool for use with parents/guardians.
- ... are a natural study aid at test time, because students have grown familiar with them (much of the content should be retained by most students *through use when needed* so that a minimal amount still needs to be "memorized" just before test time).

Next, see **Exhibit A** for aligned sample problems. Any of these problems could be assigned to students to complete in pairs in class, independently at home, or independently at school with or without the DynaNotes course notes. The presence of the DynaNotes student course notes has no impact on the assignments themselves in most cases (assuming assignments reach the appropriate rigor and are TEKS-aligned). Rather, the notes impact each student's experience as he/she works to complete the assignment. In most cases, the notes enable a stronger sense of personal progress that yields more student effort ... which yields more progress, and then more effort, and so forth:

- Students exhibit a willingness to try (empowerment).
- Students seek help in the DynaNotes well-researched, visual reference when they are "stuck" instead of requiring a verbal re-explanation from the teacher.
- As many students help themselves, teachers are freed up to spend more 1:1 face time with those who need more than a simple reminder or application example.
- Students can use the notes to point out and better describe what they do understand and what they do not understand about the notes themselves and/or the science assignment at hand.
- Teachers can adjust any student's notes access as the teacher believes is appropriate for that student, such as blocking notes access for a student who is approaching mastery until that student is checking his/her work, and then allowing him/her to regain access.
- Students can use the notes to help explain concepts and skills to other students (using correct vocabulary and accurate examples).

### DynaNotes Student Course Notes Content:

#### CHEMICAL EQUATIONS

**reactant:** starting substance in a chemical reaction

**product:** final substance in a chemical reaction

**law of conservation of mass:** mass is neither created nor destroyed during an ordinary chemical reaction

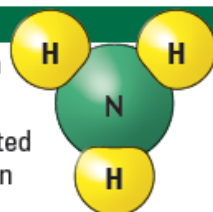
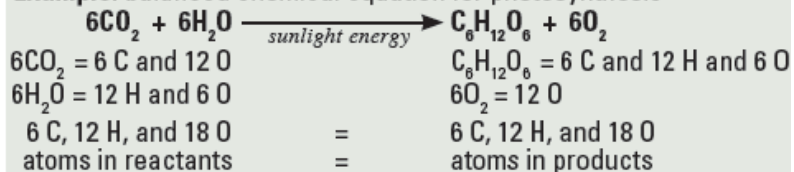
**total mass of reactants = total mass of products**

**coefficient:** number placed in front of an element symbol or chemical formula; for the number 1, no coefficient is shown; multiply the coefficient by the element's subscript to find the total number of atoms

**Example:** There are 4 molecules of NH<sub>3</sub> in 4NH<sub>3</sub> because the coefficient is 4. Each molecule of NH<sub>3</sub> has 1 atom of nitrogen (N) and 3 atoms of hydrogen (H). Therefore, 4NH<sub>3</sub> has 4 atoms of N and 12 atoms of H.

**chemical equation:** shows the number and kind of substances involved in a reaction; reactants are shown to the left of the arrow and products are shown to the right of the arrow; a **balanced** chemical equation satisfies the law of conservation of mass and has the same number of atoms of each element on both sides of the arrow

**Example:** balanced chemical equation for photosynthesis



### Building Block Standard and Aligned DynaNotes Content:

**8.5 (D)** Matter and energy. The student knows that matter is composed of atoms and has chemical and physical properties. The student is expected to recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts;

#### CHEMICAL FORMULAS CR

**chemical formula:** symbols and subscripts used to represent a substance

**subscript:** number at lower right of element's symbol in a formula; shows number of atoms for each element; for the number 1, no subscript is shown

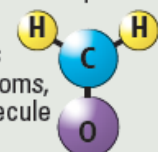
**molecule:** substance made of two or more atoms

**compound:** molecule made of two or more elements

**organic compound:** compound that includes carbon along with the element(s) hydrogen, oxygen, nitrogen, phosphorous, and/or sulfur

**Example 1:** O<sub>3</sub> is ozone's chemical formula. It has 3 oxygen atoms and no other kind of atoms. It is a molecule, but not a compound.

**Example 2:** The formula for formaldehyde is CH<sub>2</sub>O. It has 1 carbon atom, 2 hydrogen atoms, and 1 oxygen atom. It is a molecule and an organic compound.



# Exhibit A - Sample Problems

## Released STAAR Test Questions:

- 23 A teacher asks a student to write the chemical equation for photosynthesis. The student's response is shown below.



The equation is not balanced correctly. Which of these is a balanced equation for photosynthesis?

- A  $12\text{CO}_2 + \text{H}_2\text{O} \xrightarrow{\text{light}} \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$   
 B  $\text{CO}_2 + 9\text{H}_2\text{O} \xrightarrow{\text{light}} \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$   
 C  $\text{CO}_2 + \text{H}_2\text{O} \xrightarrow{\text{light}} 3\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$   
 D  $6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow{\text{light}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

- 44 How many atoms of oxygen are in a molecule of glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ )?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

## Another Example (Unique, from DynaStudy):

Which of the following chemical equations violates the law of conservation of mass?

- A.  $\text{SnO}_2 + 2\text{H}_2 \rightarrow \text{Sn} + 2\text{H}_2\text{O}$   
 B.  $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$   
 C.  $6\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$   
 D.  $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$

## DynaNotes Grade 8 Science STAAR Review & Intervention Program, Sample Answer Key Pages Aligned to 8.5 (F)

Name \_\_\_\_\_ Date \_\_\_\_\_

Activity 6 – Conservation of Mass Project (page 1 of 2)

**Student Instructions**

- Use scissors to cut out the atoms below and to the right.
- Glue the correct number of atoms in the boxes to represent each reactant and each product (you can "make molecules").
- Write the totals for each element in the reactants and in the products on the blanks provided below the boxes.
- Answer the question at the bottom using the space provided.

**reactants**                      **products**

**C** = 1                              **C** = 1  
**O** = 4                              **O** = 4  
**H** = 4                              **H** = 4

Is the equation balanced? Explain. **Yes. There are an equal number of carbon atoms, oxygen atoms, and hydrogen atoms on each side of the equation.**

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Name \_\_\_\_\_ Date \_\_\_\_\_

Activity 6 – Conservation of Mass Project (page 2 of 2)

The law of conservation of mass states that in an ordinary chemical reaction mass is neither created nor destroyed. A balanced chemical equation obeys the law of conservation of mass. It has the same number of each type of atom present in the reactants as it does in the products. For each reaction shown below, identify the reactants and products. Use the table to record the number of each type of atom present in the reactants and products. Determine whether each equation is balanced and explain your reasoning.

**Example**

$\text{HCl} + 2\text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

Element	# Atoms in Reactants	# Atoms in Products	Is the equation balanced? Explain.
H	3	2	No. There are more H atoms in the reactants than there are in the products.
Cl	1	1	
Na	2	1	
O	2	1	

Reactants: HCl, 2NaOH  
 Products: NaCl, H<sub>2</sub>O

1.  $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$

Element	# Atoms in Reactants	# Atoms in Products	Is the equation balanced? Explain.
Al	4	4	Yes. There are an equal number of Al and O atoms on each side of the equation.
O	6	6	

Reactants: 4Al, 3O<sub>2</sub>  
 Products: 2Al<sub>2</sub>O<sub>3</sub>

2.  $6\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

Element	# Atoms in Reactants	# Atoms in Products	Is the equation balanced? Explain.
C	6	6	No. There are more O and H atoms in the products than there are in the reactants.
O	13	18	
H	2	12	

Reactants: 6CO<sub>2</sub>, H<sub>2</sub>O  
 Products: C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>, 6O<sub>2</sub>

3.  $\text{SnO}_2 + 2\text{H}_2 \rightarrow \text{Sn} + 2\text{H}_2\text{O}$

Element	# Atoms in Reactants	# Atoms in Products	Is the equation balanced? Explain.
Sn	1	1	Yes. There are an equal number of Sn, O, and H atoms on each side of the equation.
O	2	2	
H	4	4	

Reactants: SnO<sub>2</sub>, 2H<sub>2</sub>  
 Products: Sn, 2H<sub>2</sub>O

4.  $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$

Element	# Atoms in Reactants	# Atoms in Products	Is the equation balanced? Explain.
Fe	4	4	Yes. There are an equal number of Fe and O atoms on each side of the equation.
O	6	6	

Reactants: 4Fe, 3O<sub>2</sub>  
 Products: 2Fe<sub>2</sub>O<sub>3</sub>

5. Circle the statement about the following chemical equation that is false:  $\text{Zn} + 2\text{HCl} \rightarrow \text{H}_2 + \text{ZnCl}_2$

A It obeys the law of conservation of mass.  
 B There are more chlorine (Cl) atoms in the products than there are in the reactants.  
 C It involves three different elements.  
 D It is a balanced chemical equation.

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