**NATURAL SCIENCES**

**Gr. 9 - LESSON PLAN -** **MATTER & MATERIALS**

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| **TOPIC:** CHEMICAL REACTIONS | | | |
| Sub-topic: Chemical Equations | | **Duration**: 1 hour | |
| **CONTENT & CONCEPTS** (CAPS p64)  **KEY CONCEPTS**  Chemical reactions can be represented with:   1. Models 2. Symbols 3. Words | | | |
| **Specific Aims:** | Specific Aim 1: ‘Doing Science’ | |  |
| Specific Aim 2: ‘Knowing the subject content and making connections’ | | **X** |
| Specific Aim 3: ‘Understanding the uses of Science ’ | |  |
| **LESSON OBJECTIVES:**   1. Learners will be able to explain what a chemical reaction is. 2. Learners will be able to represent chemical equations as:   A) Models  B) Symbols  C) Words | | | |
| **RESOURCES REQUIRED**:   * English Dictionary * Textbooks: e.g Siyavula Explore Gr. 9A | | | |
| **TEACHING & LEARNING ACTIVITY**:  **Introduction**  RECAP OF GRADE 8 WORK  In grade 8 Matter and Materials we learnt about the chemical reactions for the first time. Can you remember the main ideas about chemical reactions?  Teacher will ask learners probing questions such as:   * What is a chemical reaction?   **It is a process whereby one set of chemical substances react with each other to form a new set of chemical substances.**  **Chemical reactions occur when elements and/ compounds combine to form new substances.**  **PLEASE NOTE:**   * A chemical reaction is accompanied by **chemical change**. * A re-arrangement of atoms occurs to form new **products**. * The properties of **product(s)** differ from the original **reactants.** * **No atoms are lost or gained in chemical reactions, they are simply re-arranged – this means that the number of atoms of each type on the left should be equal to the number of atoms of those that are on the right.** * What is the difference between reactants and products?   **Reactants are substances that react with one another whilst products are the new substances that are made during chemical reaction.**   * What is the meaning of the arrow when writing a **chemical equation**? *(Please inform learners to refrain from using an equal sign when expressing a chemical equation in writing).*   The teacher explains to the learners that: A chemical equation is the symbolic representation of a chemical reaction in the form of symbols and formulae, wherein the reactant entities are given on the left-hand side and the product entities on the right-hand side.  React with each other  Form other atoms or molecules  Atoms or molecules  In mathematic equations we use an equal sign (=) for example 2 + 2 = 4, but in scientific chemical equations, we use an arrow (→), for example C + O2→ CO2.  CHEMICAL REACTIONS CAN BE REPRESENTED AS:   1. **Word equations**   When we represent a chemical reaction in terms of words, we write a word equation. For example, when hydrogen gas reacts with oxygen gas to form water, we can write a word equation for the reaction as follows:  hydrogen + oxygen→ water  To the left of the arrow, we have the 'before' situation. This side represents the substances we have before the reaction takes place. They are called the reactants. What are the reactants of this reaction? To the right of the arrow we have the 'after' situation. This sides represents the substances that we have after the reaction has taken place. They are called the products. What is the product of this reaction?  2. **Picture equations**  The same reaction of hydrogen reacting with oxygen, can also be represented in pictures called sub-microscopic diagrams. The diagram below shows that the atoms in two hydrogen molecules (H2) and one oxygen molecule (O2) on the left rearrange to form the two water molecules (H2O) on the right of the arrow. Hydrogen atoms are white circles and oxygen atoms are red circles.    What kind of representation is this: macroscopic, sub-microscopic, or symbolic?  Now we are going to convert our sub-microscopic picture to a symbolic one:  What is the product of the above reaction? What are the reactants of the above reaction? Write their formulae.  3. **Chemical equations ( Symbols )**  When we represent a chemical reaction in terms of chemical formulae (symbols), it is called a chemical equation. The chemical equation for the above reaction would be as follows:  2 H2 + O2→2 H2O  What kind of representation is this: macroscopic, sub-microscopic, or symbolic?  We still have reactants on the left and products on the right. | | | |
| **ASSESSMENT**  **LEARNERS WILL COMPLETE THIS ACTIVITY INDIVIDUALLY**  **Name Of Learner:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Grade:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Natural Sciences Test**  **Consolidation of Chemical equations**  1. Write the following chemical equations as word equations: [2 x 3 = 6]  a) C + O2 → CO2  b) Mg + O2 → MgO  2. Write the following word equations as chemical equations: [2 x 3 = 6]  a) sulfur + oxygen → sulfur dioxide  b) carbon monoxide + water → carbon dioxide + hydrogen  3. Write the following picture equations as chemical equations. [2 x 3 = 6]  • The red circles represent oxygen (O) atoms.  • The white circles represent hydrogen (H) atoms.  • The grey circles represent carbon (C) atoms.  • The yellow circles represent sulfur (S) atoms.    4. Write the following chemical equations as picture equations: [2 x 4 = 8]  a) CH4 + 2 O2 → CO2 + 2 H2O  b) CS2 + 3 O2 → CO2 + 2 SO2 | | | |

**ACTIVITY 1:** Drawing water

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**INSTRUCTIONS:**

The instruction for this activity is really simple: Draw a picture of water. You may use the space below for your drawing.

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Your drawing may look like one of the diagrams below. They all represent water. But which one is correct?



They are all correct!

The three diagrams above all represent water, but they are very different from each other. We say that they are three different **representations** of the same thing, namely water.

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