

BALANCING EQUATIONS WITH MOLECULAR MODELS – FULL LAB

Purpose: Prove that the Law of Conservation of Matter is true using molecular model kits

LAW OF CONSERVATION OF MATTER:

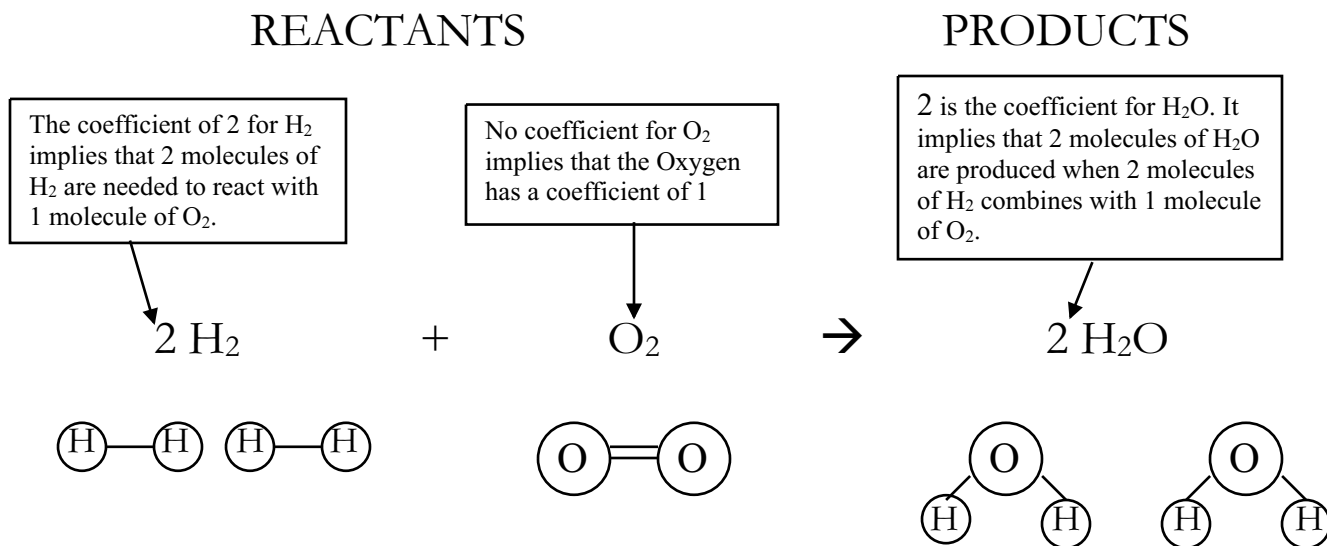
- ATOMS ARE NEITHER CREATED NOR DESTROYED DURING A CHEMICAL REACTION.
- The bonds in reactant molecules break and these atoms rearrange to make new bonds with different atoms resulting in a new compound or compounds.

Materials: You list them

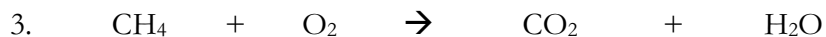
Procedure: For each of the chemical equations written below, you will perform the following tasks:

1. **Using the molecular model kit, build the reactants** (Use color guide to figure out which spheres to use.) Make sure all the atoms are fully “bonded”; that is, all the holes in the spheres are filled so each atom is “stable”.
2. **Use your reactants to build the products.** All atoms of the reactant should be used to build the models of products. If you have any atoms of the reactants left, go back and adjust the number of reactant molecules in such a way that none of the atoms are left over after you build the products. If you do not have enough atoms from the reactants to form the products, go back and adjust the number of reactant molecules so you have enough to build the products. All the “bond” pieces used in the reactants must also be used to build the products.
3. **Balance the equation by writing the correct coefficient in front of each reactant and product** of the chemical equation.
4. **STOP AND ASK YOUR TEACHER TO VERIFY BEFORE MOVING ON. GET TEACHER SIGNATURE!**
5. **ONCE YOU KNOW YOU HAVE DONE IT CORRECTLY, FILL IN YOUR DATA TABLE**
6. Continue this process for all the reactions.
7. Once you have completed all the reactions, disassemble the molecules and return all the spheres and bond pieces to the correct box.

EXAMPLE:



UNBALANCED CHEMICAL EQUATIONS:



DATA TABLE:

REACTION NUMBER	TEACHER SIGNATURE (CORRECT PRODUCTS)	DRAWING OF PRODUCTS AND 3-D STRUCTURE (SHOW COLORS) ONLY DRAW ONE MOLECULE OF EACH PRODUCT. I.E. IF 2 WATERS, JUST DRAW ONE HERE	NUMBER OF EACH ATOM ON THE REACTANT SIDE (I.E. 3H, 2N)	NUMBER OF EACH ATOM ON THE PRODUCT SIDE (I.E. 4P, 2K)	MATTER CONSERVED? YES OR NO
H2O EXAMPLE					
1.					
2.					
3.					
4.					

LAB QUESTIONS

1. DURING A CHEMICAL REACTION, WHAT HAPPENS TO THE ATOMS OF THE REACTANTS?
2. DURING A CHEMICAL REACTION, CAN NEW ATOMS BE PRODUCED? EXPLAIN WHY OR WHY NOT
3. DURING A CHEMICAL REACTION, CAN NEW MOLECULES AND COMPOUNDS BE PRODUCED? EXPLAIN WHY OR WHY NOT
4. SOME CHEMICAL REACTIONS ARE ENDOTHERMIC WHILE OTHERS ARE EXOTHERMIC. WHAT DOES THIS MEAN?
5. WHAT IS BOND ENERGY? DOES IT TAKE MORE ENERGY TO MAKE A BOND OR TO BREAK A BOND?
6. USE YOUR KNOWLEDGE OF BOND ENERGY TO DETERMINE WHICH WOULD HAVE THE HIGHER BOND ENERGY, HIGHLY REACTIVE MOLECULES OR LESS REACTIVE MOLECULES. EXPLAIN YOUR ANSWER.

FINAL SUMMARY – DISCUSS THE SCIENCE CONCEPTS THIS LAB ADDRESSES. USE VOCAB, MAKE CONCLUSIONS, DISCUSS DATA ETC. DO NOT JUST REPEAT THE PROCEDURE HERE.

COLOR GUIDE FOR MOLECULAR MODEL KIT

Black – Carbon (C)

Blue – Nitrogen (N)

White – Hydrogen (H)

Purple – Aluminum (Al)

Green – Chlorine (Cl)

Silver – Sodium (Na)

Red – Oxygen (O)