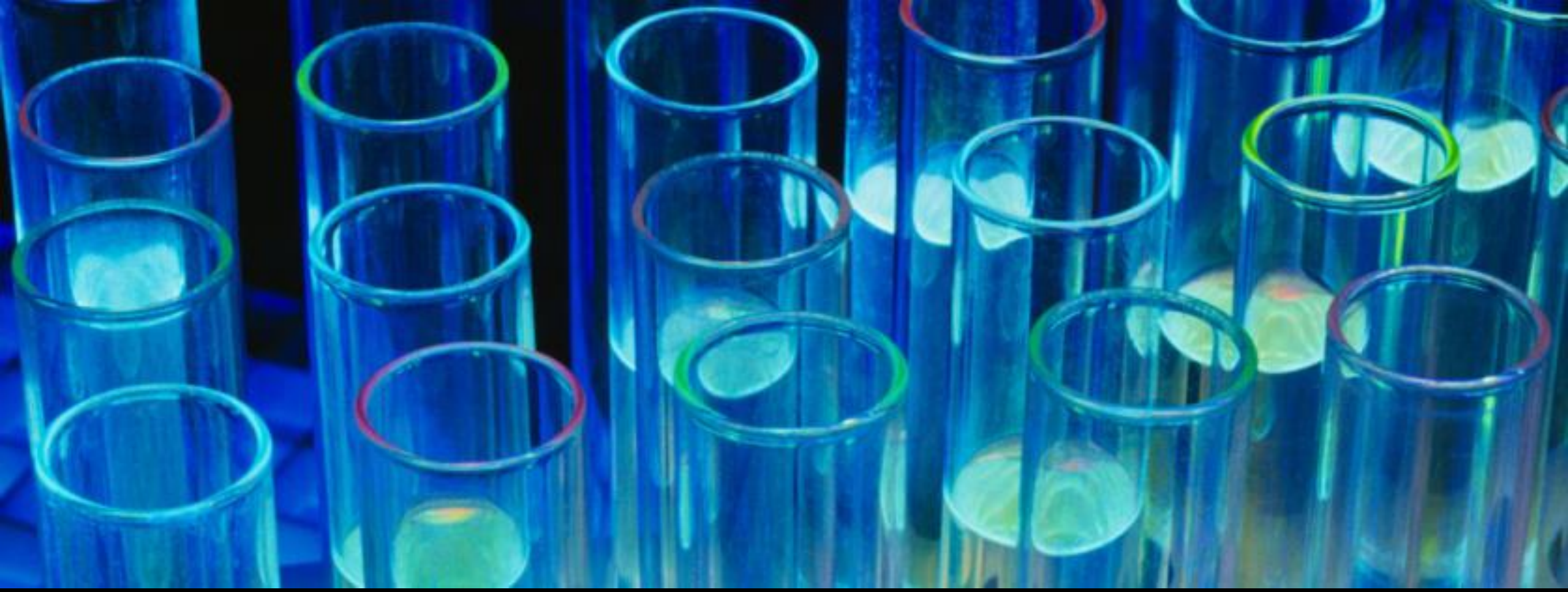

Unit 4: Chemical Reactions

Lesson 17: Atom Inventory

Guiding Question: Why is it necessary to balance a chemical equation?

Do Now:

1) Cross off “Do Now” box on page 9.
2) Turn to page 5 for notes.

Notes (page 5)

- Law of Conservation of Matter: Matter cannot be created or destroyed. In a chemical reaction atoms do not come in and out of existence, they are simply rearranged. Because these atoms have mass, the mass does not change.
- The only time that it may look like the mass has changed is when a gas is produced and leaves the system. If the reaction was done in a closed container, the mass would remain the same

Notes (page 5)

- Answer Guiding Question on page 5
  - How can we demonstrate that matter cannot be created or destroyed in a chemical reaction?

Atom Inventory

- The Law of Conservation of Mass says that we must *conserve* (save, keep) mass throughout a reaction.
- That means:
  - Mass of Reactants must equal Mass of Products
- That means:
  - We must have the same atoms and *number* of atoms on both sides of the equation
- Our chemical reactions need to show this.

Notes (page 9)

- To show that atoms we start with are conserved in a chemical reaction, we need to make sure that the reaction is balanced
- A chemical equation shows that there is the same number of each atom on the reactant and product side of the equation.
- When balancing and equation we can change the coefficient but we cannot change what compounds are present or the subscript.

Notes (page 9)

___$Na_2CO_3(aq)$ + ___$CaCl_2(aq)$ → 2 NaCl(aq) + ___$CaCO_3(s)$

Reactants	Products
Na – 2	Na – 2
C – 1	C – 1
O – 3	O – 3
Ca – 1	Ca – 1
Cl – 2	Cl – 2

Check In (page 9)

- __$CaCl_2$(aq) + __ NaOH(aq) → __$Ca(OH)_2$(s) + __NaCl(aq)

Notes (page 9)

- Answer Guiding Question on page 9.
- Turn to page 13.

Video

- https://youtu.be/nsEkKIiOz7Q

Notes (page 12)

- Chemical reactions can be divided into categories based on how the atoms in the reactants rearrange to form the products.
- Combination/Synthesis reaction: Several reactants combine to form a single product. Combination reactions are easy to spot because there is only one compound on the product side of the equation. The general reaction can be written as

$$A + B \rightarrow AB$$

- Example: $O_2 + 2H_2 \rightarrow 2H_2O$

Notes (page 12)

- <u>Decomposition</u> reaction: A compound breaks down as a result of a chemical change. Decomposition reactions are easy to spot because there is on only one reactant. The general reaction can be written as

  $AB \rightarrow A + B$

- Example: $H_2O_2 \rightarrow H_2 + O_2$

Notes (page 12)

- Single Replacement reaction: A compound breaks apart, and one part combines with another reactant – either an atom or a group of atoms (polyatomic ion). Typically, one of the reactants is an element. The general reaction can be written as

$$A + BC \rightarrow B + AC$$

- Example: $Cl_2 + MgBr_2 \rightarrow MgCl_2 + Br_2$

Notes (page 12)

- Double Replacement reaction: Both reactants break apart. Their parts then recombine into new products. Thus, the two reactants exchange parts. There general reaction can be written as

$$AB + CD \rightarrow AC + BD$$

- Example: $HCl + NaOH \rightarrow NaCl + H_2O$

Notes (page 12)

- Combustion reaction: A reactant reacts with oxygen to produce water and carbon dioxide. The general reaction can be written as

$$A + O_2 \rightarrow H_2O + CO_2$$

- Example: $CH_4 + O_2 \rightarrow H_2O + CO_2$

Closure

- After the video, complete pages 13 & 14
  - I will stamp if you are complete (you should have pages 1-14 stamped)
- Start working on Mole to Mole on pages 19-22.
- Achieve 3000: “The Missouri gets a Makeover” due Friday 3/23 at 11:59pm
- Benchmark #3 on 3/28 & 3/29
- Homework #5 due Friday, 3/23