Chemistry Name: _____

Section _____ BALANCING EQUATIONS Date: _____

Balancing Chemical Equations Lab #21

Pre-Lab Discussion:

Matter is conserved during a chemical reaction. Seeing the atoms is not easy to do. In this activity, models of atoms will be used to build molecules, balance chemical reactions, label reaction types, and allow visualization of how matter is conserved in a reaction.

Research Questions:

How can the concept of conservation of matter be used to balance chemical equations?

Materials:

Pen, pencil, or colored pencils

Method:

1. Balance each equation in the Data Collection and Processing section.
2. Use circles with atom or ion symbols to represent each atom or polyatomic ion. If polyatomic ions stay together, put the entire ion in a circle.
3. Build one molecule or formula of each reactant on the left tray and one molecule of each product on the right tray.
4. Count all the atoms (or polyatomic ions) on the reactant side and all the atoms (or ions) on the product side.
5. If the atom counts are equal, the equation is already balanced. If it is not equal, add an additional atom, ion, or molecule to the deficient side. Work left – right – left adding molecules of R or P until the equation is balanced.

Helpful Balancing Tips:

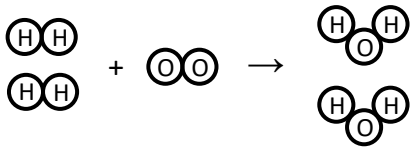
- Start with the most complicated molecule. If there does not seem to be one, start by balancing an element that occurs only once on each side of the equation. Otherwise, simply start balancing by moving systematically left – right – left.
- Treat polyatomic ions (such as NO_3^- and SO_4^{2-}) as single units rather than individual atoms. (In this activity, use only one circle with a formula for each polyatomic ion.)
- If water occurs in a reaction, balance hydrogen and oxygen last.
- Check all finished equations using atom tracking.

Data Collection and Processing:

1. _____ H_2 + _____ O_2 → _____ H_2O

   Reaction type: _____

   Molecular representation:



2. _____ $BaCl_2$ + _____ Na_2SO_4 → _____ $BaSO_4$ + _____ NaCl

Reaction type: _____

Molecular representation:

3. _____ Si + _____ Cl_2 → _____ $SiCl_4$

Reaction type: _____

Molecular representation:

4. _____ Cl_2 + _____ KBr → _____ KCl + _____ Br_2

Reaction type: _____

Molecular representation:

5. _____ Na + _____ Cl_2 → _____ NaCl

Reaction type: _____

Molecular representation:

6. _____ N_2 + _____ H_2 → _____ NH_3

Reaction type: _____

Molecular representation:

7. _____ $NaHCO_3$ → _____ Na_2CO_3 + _____ CO_2 + _____ H_2O

Reaction type: _____

Molecular representation:

8. _____ Al + _____ O_2 → _____ Al_2O_3

Reaction type: _____

Molecular representation:

9. _____ CH_4 + _____ O_2 → _____ CO_2 + _____ H_2O

Reaction type: _____

Molecular representation:

10. _____ HCl + _____ $Zn \rightarrow$ _____ $ZnCl_2$ + _____ H_2

Reaction type: _____

Molecular representation:

11. _____ Li + _____ $O_2 \rightarrow$ _____ Li_2O

Reaction type: _____

Molecular representation:

12. _____ $AgNO_3$ + _____ $Cu \rightarrow$ _____ $Cu(NO_3)_2$ + _____ Ag

Reaction type: _____

Molecular representation:

13. _____ C_3H_8 + _____ $O_2 \rightarrow$ _____ CO_2 + _____ H_2O

Reaction type: _____

Molecular representation:

14. _____ $CaCO_3$ → _____ CaO + _____ CO_2

Reaction type: _____

Molecular representation:

15. _____ NaOH + _____ HCl → _____ NaCl + _____ H_2O

Reaction type: _____

Molecular representation:

16. _____ HgO → _____ Hg + _____ O_2

Reaction type: _____

Molecular representation:

17. _____ H_2O + _____ Fe → _____ Fe_2O_3 + _____ H_2

Reaction type: _____

Molecular representation:

18. _____ Al + _____ HCl → _____ $AlCl_3$ + _____ H_2

Reaction type: _____

Molecular representation:

19. _____ K + _____ H_2O → _____ KOH + _____ H_2

Reaction type: _____

Molecular representation:

20. _____ NH_3 + _____ O_2 → _____ NO + _____ H_2O

Reaction type: _____

Molecular representation:

Conclusions:

1. Explain why an equation must be balanced in order to accurately represent a chemical reaction.

_____

_____

_____

_____

_____

2. Balance the following equations by adding appropriate coefficients on each line. Identify the reaction type for each equation.

a _____ $KClO_3 \rightarrow$ _____ KCl + _____ O_2 _____

b _____ Al + _____ $CuCl_2 \rightarrow$ _____ Cu + _____ $AlCl_3$ _____

c _____ P_4 + _____ $O_2 \rightarrow$ _____ P_2O_{10} _____

d _____ C_4H_6 + _____ $O_2 \rightarrow$ _____ CO_2 + _____ H_2O _____

e _____ $AgNO_3$ + _____ NaCl $\rightarrow$ _____ AgCl +_____ $NaNO_3$ _____

Applications:

1. What did you personally learn from this lab?

_____

_____

2. Explain who in the real world might use this application and describe how that would look.

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