**Chemical Reactions and Balancing Chemical Equations Web Quest**

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_**

**Chemical Equations**

[http://web.archive.org/web/20131203110147/http://www.files.chem.vt.edu/RVGS/ACT/notes/Types\_of\_Equations.html](http://web.archive.org/web/20131203110147/http:/www.files.chem.vt.edu/RVGS/ACT/notes/Types_of_Equations.html%20)

Click “Directions”

1. What three things does a balanced equation show you?
2. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which enter into a reaction.
3. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which are formed by the reaction.
4. The amounts of each substance \_\_\_\_\_\_\_\_\_\_\_\_ and each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ produced.
5. What two things must we remember when balancing equations?
6. Every chemical compound has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which cannot be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. A chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ must account for every \_\_\_\_\_\_\_\_\_\_\_ that is used, which is an application of the Law of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_.
8. What does the mean? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
9. What does the mean? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Classic ChemBalancer** –

<http://funbasedlearning.com/chemistry/chemBalancer/default.htm>

(1) Click the button for “Directions” and **read carefully**. Click the “OK” button and return to the game screen.

(2) Click “Start Game” button to give it a try!

(3) Start by adding a “1” in each box and compare the number of atoms of each element you have on each side of the equation.

(4) Change coefficients to balance each equation and click the “Balanced” button to check it. If it is wrong, correct it!

(5) Use the information in the pop-up windows to answer each question and then write the balanced equation before clicking the “OK” button.

#1 #2

What is HCl?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Where is it found in the body?\_\_\_\_\_\_\_\_\_\_\_\_

What does “ferrum” mean?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What color is sulfur?\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#3 #4

What was the Hindenberg?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What gas was used in it?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What gas is used today?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What are pyrotechnics?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#5 #6

What does the symbol “Hg” represent? \_\_\_\_\_\_

Why should you never touch it?\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What gas is produced when calcium metal is dropped in water?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#7 #8

What is H2O2? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is it used for?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is CH4?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What gases is it related to?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#9 #10

What is ammonia used for today?\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

How is the oxidation of aluminum different from that of iron?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#11

What gas is released when potassium permanganate is decomposed?\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Now go to this website and work on balancing the equations. Read the directions (due to the

program you will need to include coefficients of “1”, unlike when we balance normally in class).

You can complete a problem and go to the bottom of the page and click “check” whenever

you’d like. Use the back button to continue working. Fill in the Coefficients on the follow page.

<http://www.sciencegeek.net/Chemistry/taters/EquationBalancing.htm>

1.       ****H2 + ****O2 → ****H2O  
  
2.       ****H2 + ****N2 → ****NH3  
  
3.       ****Al2O3 → ****Al + ****O2  
  
4.       ****KClO3 → ****KCl + ****O2  
  
5.       ****S8 + ****O2 → ****SO2  
  
6.       ****C2H6 + ****O2 → ****CO2 + ****H2O  
  
7.       ****Al2(SO4)3 + ****Ca(OH)2 → ****Al(OH)3 + ****CaSO4  
8.       ****P4 + ****O2 → ****P2O5  
  
9.       ****Ag + ****S8 → ****Ag2S  
  
10.       ****Al + ****Br2 → ****AlBr3  
  
11.       ****Cr + ****O2 → ****Cr2O3  
  
12.       ****NaClO3 → ****NaCl + ****O2  
  
13.       ****AlBr3 + ****Cl2 → ****AlCl3 + ****Br2  
  
14.       ****Na + ****H2O → ****NaOH + ****H2  
  
15.       ****AlI3 + ****HgCl2 → ****AlCl3 + ****HgI2  
  
16.       ****Ca(OH)2 + ****H3PO4 → ****Ca3(PO4)2 + ****H2O  
  
17.       ****AgNO3 + ****K3PO4 → ****Ag3PO4 + ****KNO3  
  
18.       ****C3H8 + ****O2 → ****CO2 + ****H2O  
  
19.       ****C2H2 + ****O2 → ****CO2 + ****H2O  
  
20.       ****C6H6 + ****O2 → ****CO2 + ****H2O

Load the simulation *Balancing Chemical Equations* <http://phet.colorado.edu/en/simulation/balancing-chemical-equations>

1. Explore the ***Balancing Chemical Equations*** simulation.
2. What are the different ways that the simulation indicates when an equation is balanced?
3. For each balanced reaction, indicate the total number of molecules in the table below.

|  |  |  |
| --- | --- | --- |
| **Reaction** | **Total Number of Molecules** | |
|  | **Reactant Side (Left)** | **Product Side (Right)** |
| Make Ammonia |  |  |
| Separate Water |  |  |
| Combust Methane |  |  |

1. Is the number of total molecules on the left side of a balanced equation always equal to the number of total molecules on the right side of the equation? Explain your answer.
2. For each balanced reaction, indicate the total number of atoms in the table below.

|  |  |  |
| --- | --- | --- |
| **Reaction** | **Total Number of Atoms** | |
|  | **Reactant Side (Left)** | **Product Side (Right)** |
| Make Ammonia |  |  |
| Separate Water |  |  |
| Combust Methane |  |  |

1. Is the number of total atoms on the left side of a balanced equation always equal to the number of total atoms on the right side of the equation?
2. What is the same on the left and right side of a balanced equation? Explain your answer.
3. Play level 1 and 2 of the balancing equation game. Write down the strategies you use to balance chemical equations.
4. In the simulation, were you able to use noninteger numbers (like ½ or 0.43) for the coefficients in a balanced equation? Why do you think this is?
5. Which of the following are coefficients you could use in a balanced equation?

☐ ½ ☐ ¾ ☐ 1 ☐ 2 ☐ 6 ☐ 9

1. If you were balancing an equation containing the O2 molecule, which of the following would be correct representations of O2 and its coefficient?

☐ ½O2 ☐ O2 ☐ 3O2 ☐ 6O2 ☐ 3O ☐ 5O3

1. What do you have to do to the coefficients of equation I below to get to equation II?
2. 2 SnO2 + 4 H2 🡪 2 Sn + 4 H2O
3. SnO2 + 2 H2 🡪 Sn + 2 H2O
   1. Both equation I and II are balanced, but equation I is the correct way to write the balanced equation.
   2. Can you divide equation II by another factor and still have it be correct? Why or why not?
   3. In a complete sentence, write down a method you could use to determine if an equation is written in the correct way.
4. Start level 3 of the balancing equation game. Write down the equations as you solve them, along with any new strategies you needed for balancing.

***WEBSITE 1: Use the following website to answer the questions 1—8:***

<http://www.britannica.com/EBchecked/topic/108802/chemical-reaction>

1. What is a chemical reaction?
2. Give 3 examples of chemical reactions.
3. \_
4. \_
5. \_
6. Name two ways that a physical change is different from a chemical reaction.
   1. \_
   2. \_
7. Who discovered 33 elements, which led to the idea that chemical reactions involve the combination of elements, and encouraged others to pursue chemistry as a quantitative science?
8. What other scientist’s work was crucial to the history of the chemical reaction?

*Click to page Next Page*

1. What is the Law of Conservation of Matter?
2. What does it mean to have a chemical equation that is “balanced”?
3. What is stoichiometry?

***WEBSITE 2: Use the following website to answer questions 9—11:***

<http://chemistry.about.com/od/chemicalreactions/a/Synthesis-Reactions.htm>

1. What is a **synthesis** reaction?
2. What is the general form of a synthesis reaction?
3. Give one example of a synthesis reaction.

***WEBSITE 3: Use the following website to answer questions 12—14:***

<http://chemistry.about.com/od/chemicalreactions/a/chemical-decomposition-reaction.htm>

1. What is a **decomposition** reaction?
2. What is the general form of a decomposition reaction?
3. Give one example of a decomposition reaction.

***WEBSITE 4: Use the following website to answer questions 15—17:***

<http://chemistry.about.com/od/chemistryglossary/g/Single-Displacement-Reaction-Definition.htm>

1. What is a **single-displacement** reaction?
2. What is the general form of a single-displacement reaction?
3. Give an example of a single-displacement reaction.

***WEBSITE 5: Use the following website to answer questions 18—20:***

<http://chemistry.about.com/od/chemistryglossary/g/Double-Displacement-Reaction-Definition.htm>

1. What is a **double-displacement** reaction?
2. What is the general form of a double-displacement reaction?
3. Give an example of a double-displacement reaction.

***WEBSITE 6: Use the following website to answer questions 21—23:***

<http://chemistry.about.com/od/chemicalreactions/a/Combustion-Reactions.htm>

1. What is a **combustion** reaction?
2. What is the general form of a combustion reaction?
3. Give one example of a combustion reaction.

***WEBSITE 7: Use the following website to answer questions 24—28:***

<http://www.education.com/science-fair/article/chemical-reations-absorb-release-energy/>

1. What does the Greek root *“therm”* mean? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What does the Greek root *“endo”* mean? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What does the Greek root *“exo”* mean? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What is an endothermic reaction? Give an example of an endothermic reaction.
5. What is an exothermic reaction? Give an example of an exothermic reaction.

***WEBSITE 8: Use the following website to answer questions 29—31:***

<http://www.chem4kids.com/files/react_rates.html>

1. What is rate of a reaction?
2. What does it say about the molecules in a reaction if the rate is high or low?
3. Name 3 things that affect reaction rate AND HOW.

***On the right side of this page, click Equilibrium 1 to answer questions 32—39.***

1. What is equilibrium?
2. Name three characteristics of equilibrium.

*Click Part Two*

1. Who was Le Chatelier and what was his principal regarding equilibrium?

*Click Next Page on Chemical Reactions*

1. What is a catalyst?
2. What is activation energy?
3. How do catalysts impact equilibrium?
4. What is an inhibitor?
5. Why are inhibitors useful?

**SUMMARY OF REACTION TYPES**

|  |  |
| --- | --- |
| **A) Synthesis Reactions:**  General equation:  Word equation:  Chemical equation:  How to recognize reaction: | **B) Decomposition Reactions:**  General equation:  Word equation:  Chemical equation:  How to recognize reaction: |
| **C) Single Displacement Reactions:**  General equation:  Word equation:  Chemical equation:  How to recognize reaction: | **D) Double Displacement Reactions:**  General equation:  Word equation:  Chemical equation:  How to recognize reaction: |
| **E) Combustion Reactions:** | |
| i) Complete Combustion of Hydrocarbons:  Word equation:  Chemical equation:  Reactants ALWAYS include: Products ALWAYS include: | ii) Incomplete Combustion of Hydrocarbons:  Word equation:  Chemical equation:  Reactants ALWAYS include: Products ALWAYS include: |
| **F) Neutralization (Acid-Base) Reactions (a special type of double displacement):**  General equation: Word Equation:    Chemical Equation: How to recognize reaction: | |