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| **Objectives:** | | |
| * Use the seven steps of balancing equations by inspection. |  |  |

**Chemical Equation:**   
**a way to represent chemical reactions on paper.**

http://www.howe.k12.ok.us/~jimaskew/chem/hint.gif **Equations must be balanced because:**

Atoms can be neither created nor destroyed in an ordinary chemical reaction, so there must be the same number of atoms on both sides of the equation.

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| **These numbers are found in a chemical equation:**   * **Subscripts**   The small numbers to the lower right of chemical symbols. Subscripts represent the number of atoms of each element in the molecule.   * **Coefficients**   The large numbers in front of chemical formulas. Coefficients represent the number of molecules of the substance in the reaction. | Two molecules of water |

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|  | **The order in which the following steps are performed is important.** While shortcuts are possible, following these steps in order is the best way to be sure you are correct. |

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Balancing Equations By Inspection**  **http://www.howe.k12.ok.us/~jimaskew/chem/check.gif1. Check for Diatomic Molecules - H2 - N2 - O2 - F2 - Cl2 - Br2 - I2**  If these elements appear **by themselves** in an equation, they **must** be written with the subscript **2**   |  |  |  |  | | --- | --- | --- | --- | | **http://www.howe.k12.ok.us/~jimaskew/chem/check.gif2. Balance Metals**  **http://www.howe.k12.ok.us/~jimaskew/chem/check.gif3. Balance Nonmetals**  **http://www.howe.k12.ok.us/~jimaskew/chem/check.gif4. Balance Oxygen**  **http://www.howe.k12.ok.us/~jimaskew/chem/check.gif5. Balance Hydrogen**  **http://www.howe.k12.ok.us/~jimaskew/chem/check.gif6. Recount All Atoms** | |  |  | | --- | --- | |  | Balance equations by changing **coefficients** http://www.howe.k12.ok.us/~jimaskew/ps/smile.gif  **never** by changing **subscripts** http://www.howe.k12.ok.us/~jimaskew/ps/not.gif | |   If the atoms are not balanced at this point, there is a problem somewhere. Work your way back up the steps, **from bottom to top**, until you find the problem, and correct it.  **http://www.howe.k12.ok.us/~jimaskew/chem/check.gif7. If every coefficient will reduce, rewrite in the simplest whole-number ratio.**  An equation is not properly balanced if the coefficients are not written in their lowest whole-number ratio. | |

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| |  | | --- | | **Practice Problem Set #1:**  Write the balanced equation for each of the following:   1. sodium hydroxide http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgsodium oxide + water 2. iron + oxygen http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgiron (III) oxide 3. carbon dioxide + water http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgglucose + oxygen 4. iron (II) sulfide + hydrochloric acid http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgiron (II) chloride + hydrogen sulfide 5. oxygen + hydrogen http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpg Water 6. chlorine + sodium iodide http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpg Iodine + sodium chloride 7. aluminum nitrate + sulfuric acid http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpg aluminum sulfate 8. silver oxide http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpg silver + oxygen 9. ammonium phosphate + barium hydroxide http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpg ammonium hydroxide + barium phosphate 10. calcium hydroxide + nitric acid http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpg calcium nitrate + water | |  | |

**More Practice Balancing Equations:**

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