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| **Objectives:** |
| * Use the seven steps of balancing equations by inspection.
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**Chemical Equation:**
**a way to represent chemical reactions on paper.**

 **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**

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| **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**  |

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|  | 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 |

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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
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**More Practice Balancing Equations:**

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| **Practice Problem Set #2**   1. S8 + O2 http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgSO3
2. HgO http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgHg + O
3. Na + H2O http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgNaOH + H
4. C10H16 + Cl http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgC + HCl
5. FeS2 + O2 http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgFe2O3 + SO2
6. K + Br http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpg
7. SiO2 + HF http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpg
8. KClO3 http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgKCl + O
9. P4O10 + H2O http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgH3PO4
10. Sb + O http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgSb4O6
11. Ca3(PO4)2 + SiO2 + C http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgCaSiO3 + P4 + CO
12. HClO4 + P4O10 http://www.howe.k12.ok.us/~jimaskew/chem/arrow.jpgH3PO4 + Cl2O7
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