

Chemical Reactions & Balancing Worksheets

You may write on all pages of the worksheets.

Introduction to Chemical Reactions – see powerpoint on website

<http://domb.theteterszone.net/reactionpres.html>

1. Name 4 pieces of evidence that indicate that a chemical change has taken place.
2. What is the law of conservation of mass?
3. In a chemical reaction, the substances that are about to react are called _____ . The new substances produced are called _____ .
4. An expression that describes a chemical reaction using chemical formulas and other symbols is called a _____ .
5. The symbol "(aq)" stands for _____ , meaning _____ .
6. What does the arrow in a chemical equation mean?
7. How are the physical states of matter indicated in a chemical reaction?
8. Numbers written in front of the formulas in a chemical equation are called _____ . What do they represent?
9. Describe the type of particle in the following: (use atom, molecule or unit
 - a) ionic compound (NaCl) _____
 - b) covalent compound (H₂O) _____
 - c) atom (Cu) _____

Balancing Equations – see powerpoint on website

10. What makes a chemical equation "balanced?"
 11. When balancing equation, never change the _____. Only add whole-number _____ in front of the formulas.
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Write Chemical Equations from Words

For each of the following reactions, translate words into formulas and symbols. Be sure to include coefficients and physical states for every substance. THEN, write the equation and illustrate it on poster paper. Use different colors to represent each element. Check your illustration for conservation of mass.

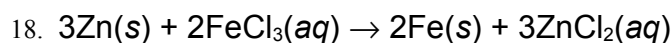
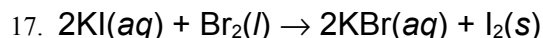
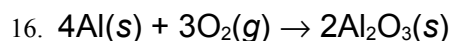
12. Two atoms of solid lithium react with two molecules of liquid water to produce two units of aqueous lithium hydroxide and one molecule of hydrogen gas.

13. When heated, a unit of solid calcium carbonate yields a unit of solid calcium oxide and a molecule of carbon dioxide gas.

14. Two atoms of solid sodium and one molecule of chlorine gas combine to form two units of solid sodium chloride. (Remember diatomic elements!)

15. Aqueous sulfuric acid decomposes to form gaseous sulfur trioxide and water.

For each of the following reactions, translate formulas and symbols into words. Be sure to account for coefficients and physical states. THEN, write the equation and illustrate it on poster paper. Use different colors to represent each element. Check your illustrations for conservation of mass.

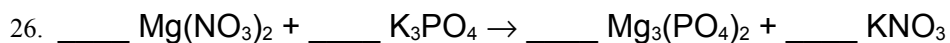
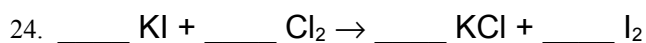
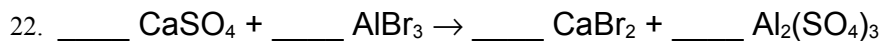
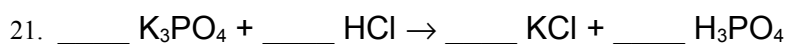
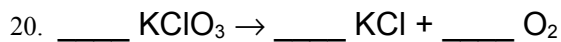
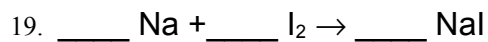


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Balancing Equations

Add *coefficients* to balance the following chemical equations.



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Writing & Balancing Equations (Part 2)

Write and balance the following chemical equations.

27. Nitrogen plus hydrogen yield ammonia. (Remember diatomic elements!)

28. Sodium oxide combines with water to form sodium hydroxide.

29. Sodium sulfate reacts with calcium nitrate to produce sodium nitrate and calcium sulfate.

30. Zinc reacts with iron(III) chloride yielding zinc chloride plus iron.

31. Hydrogen plus oxygen yield water. (Remember diatomic elements!)

32. Sodium reacts with magnesium chloride yielding sodium chloride plus magnesium.

33. Aluminum bromide plus chlorine yield aluminum chloride and bromine.

34. Aluminum nitrate and sodium sulfide react to form aluminum sulfide and sodium nitrate.

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Types of Reactions - <http://domb.theteterszone.net/reactionpres.html>

Balance the following chemical equations. Then in the space provided, indicate the type of reaction – synthesis, decomposition, single replacement, double replacement, or combustion.



Determine what type of reaction is occurring in each of the following scenarios.

41. When camping, most food is cooked on butane stoves. What type of reaction is taking place when butane (C_4H_{10}) burns to produce a flame?

42. Hydrogen peroxide (H_2O_2) is kept in a dark brown bottle because light causes it to spontaneously break down into water and oxygen gas. What type of reaction is this?

43. When you leave your little red wagon outside, the iron combines with oxygen in the atmosphere to produce rust (Fe_2O_3). What type of reaction is this?

CLASSIFY EACH REACTION AS EXOTHERMIC OR ENDOTHERMIC- see powerpoint on website (Energy & Chemical Reactions)

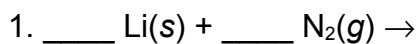
1. $\text{PCl}_3 + \text{Cl}_2 \rightarrow \text{PCl}_5 + \text{energy}$
2. $2\text{Sb} + 3\text{I}_2 + \text{heat} \rightarrow 2\text{SbI}_3$
3. $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{heat}$
4. $\text{CaCO}_3 + \text{energy} \rightarrow \text{CaO} + \text{C}$

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Predicting Products & Types of Reactions

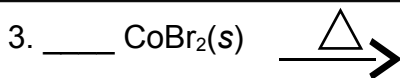
For each of the following reactions, identify the reaction type, predict the products and balance the equation. Include physical states. Word equations must first be converted to formulas.



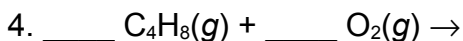
Reaction Type: _____



Reaction Type: _____



Reaction Type: _____



Reaction Type: _____

5. Aqueous solutions of potassium bromide and silver nitrate react to form a white precipitate.

Reaction Type: _____

6. Solid nickel is added to an aqueous solution of iron(II) sulfate.

Reaction Type: _____

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Extra Practice: Balance the following chemical equations by writing coefficients in front of each substance as necessary.

37. $\text{As} + \text{Cl}_2 \rightarrow \text{As}_2\text{Cl}_3$
38. $\text{K} + \text{Cl}_2 \rightarrow \text{KCl}$
39. $\text{Cu} + \text{O}_2 \rightarrow \text{Cu}_2\text{O}$
40. $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$
41. $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$
42. $\text{Fe} + \text{Cl}_2 \rightarrow \text{FeCl}_3$
43. $\text{Zn} + \text{O}_2 \rightarrow \text{ZnO}$
44. $\text{Si} + \text{S} \rightarrow \text{Si}_2\text{S}_4$
45. $\text{Al} + \text{N}_2 \rightarrow \text{AlN}$
46. $\text{Al} + \text{O}_2 \rightarrow \text{Al}_2\text{O}_3$
47. $\text{Hg}_2\text{CO}_3 \rightarrow \text{Hg} + \text{HgO} + \text{CO}_2$
48. $\text{H}_2\text{O} \rightarrow \text{H}_2 + \text{O}_2$
49. $\text{AuCl}_3 \rightarrow \text{Au} + \text{Cl}_2$
50. $\text{NCl}_3 \rightarrow \text{N}_2 + \text{Cl}_2$
51. $(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \rightarrow \text{Cr}_2\text{O}_3 + \text{N}_2 + \text{H}_2\text{O}$
52. $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
53. $\text{O}_2 \rightarrow \text{O}_3$
54. $\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$
55. $\text{H}_2\text{SiO}_3 \rightarrow \text{SiO}_2 + \text{H}_2\text{O}$
56. $\text{MgCO}_3 \rightarrow \text{MgO} + \text{CO}_2$
57. $\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$
58. $\text{Ca} + \text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2$
59. $\text{Fe} + \text{CuCl} \rightarrow \text{FeCl}_3 + \text{Cu}$
60. $\text{Fe}_2\text{O}_3 + \text{H}_2 \rightarrow \text{Fe} + \text{H}_2\text{O}$
61. $\text{SiC} + \text{Cl}_2 \rightarrow \text{SiCl}_4 + \text{C}$
62. $\text{Zn} + \text{FeCl}_3 \rightarrow \text{Fe} + \text{ZnCl}_2$
63. $\text{NaBr} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{Br}_2$
64. $\text{K} + \text{NiCl}_2 \rightarrow \text{Ni} + \text{KCl}$
65. $\text{Ca} + \text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2$
66. $\text{Li} + \text{BaSO}_4 \rightarrow \text{Li}_2\text{SO}_4 + \text{Ba}$
67. $\text{Hg}_2\text{Cl}_2 + \text{HI} \rightarrow \text{Hg}_2\text{I}_2 + \text{HCl}$
68. $\text{KCl} + \text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + \text{HCl}$

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69. $\text{BaCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + \text{H}_2\text{CO}_3$
70. $\text{PbI}_2 + \text{HNO}_3 \rightarrow \text{Pb}(\text{NO}_3)_2 + \text{HI}$
71. $\text{FeBr}_3 + \text{Ba}(\text{OH})_2 \rightarrow \text{Fe}(\text{OH})_3 + \text{BaBr}_2$
72. $\text{Ag}_2\text{SO}_4 + \text{Cu}(\text{ClO}_3)_2 \rightarrow \text{CuSO}_4 + \text{AgClO}_3$
73. $\text{V}_2\text{O}_5 + \text{HCl} \rightarrow \text{VOCl}_3 + \text{H}_2\text{O}$
74. $\text{HI} + \text{H}_2\text{SO}_4 \rightarrow \text{H}_2\text{S} + \text{H}_2\text{O} + \text{I}_2$
75. $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
76. $\text{Ag}_2\text{S} + \text{KCN} \rightarrow \text{KAg}(\text{CN})_2 + \text{K}_2\text{S}$
77. $\text{Ag}_2\text{SO}_4 + \text{NH}_4\text{Cl} \rightarrow (\text{NH}_4)_2\text{SO}_4 + \text{AgCl}$
78. $\text{CaCl}_2 + \text{K}_3\text{PO}_4 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + \text{KCl}$
79. $\text{NH}_4\text{OH} + \text{H}_2\text{SO}_4 \rightarrow (\text{NH}_4)_2\text{SO}_4 + \text{H}_2\text{O}$
80. $\text{AgNO}_3 + \text{AlCl}_3 \rightarrow \text{Al}(\text{NO}_3)_3 + \text{AgCl}$
81. $\text{MnO}_2 + \text{HCl} \rightarrow \text{Cl}_2 + \text{MnCl}_2 + \text{H}_2\text{O}$
82. $\text{Ba}(\text{OH})_2 + \text{HNO}_3 \rightarrow \text{Ba}(\text{NO}_3)_2 + \text{H}_2\text{O}$
83. $\text{Ca}_3(\text{PO}_4)_2 + \text{SiO}_2 + \text{C} \rightarrow \text{CaSiO}_3 + \text{P} + \text{CO}_2$
84. $\text{H}_3\text{PO}_4 + \text{NaOH} \rightarrow \text{Na}_2\text{HPO}_4 + \text{H}_2\text{O}$
85. $\text{Ca}_3\text{P}_2 + \text{H}_2\text{O} \rightarrow \text{PH}_3 + \text{Ca}(\text{OH})_2$
86. $\text{Mg}_3\text{As}_2 + \text{HCl} \rightarrow \text{AsH}_3 + \text{MgCl}_2$
87. $\text{P} + \text{O}_2 \rightarrow \text{P}_2\text{O}_5$
88. $\text{Ca} + \text{O}_2 \rightarrow \text{CaO}$
89. $\text{C}_6\text{H}_6 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
90. $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
91. $\text{CaCO}_3 + \text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$
92. $\text{C}_2\text{H}_2 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
93. $\text{C}_8\text{H}_{18} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$