

# Reactions Notes

1. In a chemical reaction, sometimes \_\_\_\_\_ and sometimes \_\_\_\_\_, and sometimes both happen.

Every time a reaction occurs \_\_\_\_\_.

These new substances have their own \_\_\_\_\_ that are not like the properties of the reactants. There are 5 of kinds of reactions that we learn about.

The first kind of reaction is called the \_\_\_\_\_ REACTION.

Sometimes it's called a \_\_\_\_\_ reaction

2. In a synthesis reaction, \_\_\_\_\_ reactants combine to form larger products.

3. The "ABSTRACT" is \_\_\_\_\_

4. The \_\_\_\_\_.

*Let's review some vocabulary so we can all talk properly (not like me!)*

5. The \_\_\_\_\_ are the substances that we \_\_\_\_\_ with, they react together and form the \_\_\_\_\_. Products are what we end up with.

6. In a synthesis reaction, we have two or more reactants that form into one larger product.

7. In this reaction we have 2 smaller reactants: \_\_\_\_\_ and \_\_\_\_\_ gases.

8. They form into one larger product, the \_\_\_\_\_.

9. It takes energy to start the reaction, but way more energy comes out with the products. Overall, or net, this is an \_\_\_\_\_ reaction, more energy comes out than goes in.

10. A WORD EQUATION

11. The word equation for this reaction will be:

12. The “skeleton” reaction for hydrogen and oxygen make water is

\_\_\_\_\_ → \_\_\_\_\_

13. Skip this one!

14. Glinda the Good Witch from the Wizard of Oz tells us the best way to balance an equation. Her advice:

\_\_\_\_\_

15. We will (once) write the skeleton reaction again. Then we’ll balance it. Usually we write out the skeleton properly, then balance right “on top” of it. We wanted to keep “one skeleton” in our closet!, so you can remember what they are. From now on, we balance ON the skeleton. Re write the skeleton from #12 now

\_\_\_\_\_ → \_\_\_\_\_

16. Add in the PHASE SYMBOLS above now.

17. Now re write the balanced chemical equation with the “energy” showing the balanced thermochemical equation. We will not need to redo this in steps again.

\_\_\_\_\_ → \_\_\_\_\_

18. An important chemical adage: \_\_\_\_\_

19. It’s reverse is cool too: \_\_\_\_\_

20.

21.

22. Sodium and chlorine make sodium chloride (balance this now)

\_\_\_\_\_ → \_\_\_\_\_

23. Word equation: Iron + Oxygen synthesizes to iron III oxide (rust) write the skeleton, then balance it:

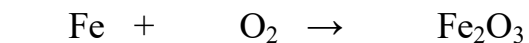
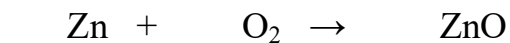
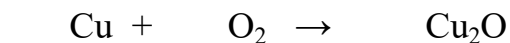
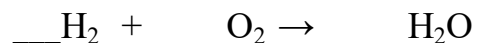
\_\_\_\_\_ → \_\_\_\_\_

24. Word equation: Aluminum + sulfur synthesize into aluminum sulfide write the skeleton, then balance it:

\_\_\_\_\_ → \_\_\_\_\_

25. Word equation: Potassium and bromine make potassium bromide write the skeleton, then balance it:

26. Balance these skeleton reactions, put the coefficients on the dashes. Do NOT write in any "ones".



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27. Decomposition Reactions...

Example: Lead II oxide decomposes into lead and oxygen

\_\_\_\_\_ → \_\_\_\_\_

28. Decomposition reactions require \_\_\_\_\_ to break down into

\_\_\_\_\_

29. Example of the Abstract: \_\_\_\_\_

30. Word equation for our demonstration hydrogen peroxide decomposes into water & oxygen gas

31. Skeleton equation \_\_\_\_\_

32. Balance it now. Add phase symbols

33. How do we make chemical reactions go faster? We can add a \_\_\_\_\_

34. Show where you add the catalyst in above, where it belongs.

35. The...

36. With no catalyst, a reaction will \_\_\_\_\_

With a catalyst the same reaction will occur, just \_\_\_\_\_

37. Magnesium nitride decomposes into magnesium & nitrogen. Write the skeleton, then balance it:

\_\_\_\_\_ → \_\_\_\_\_

38. Magnesium carbonate decomposes into carbon dioxide & magnesium oxide. Write the skeleton, + balance

\_\_\_\_\_ → \_\_\_\_\_

39. Iron (III) decomposes. Write the skeleton, then balance it:

\_\_\_\_\_ → \_\_\_\_\_

40. Ammonia gas decomposes. Write the skeleton, then balance it:

\_\_\_\_\_ → \_\_\_\_\_

41. Hydrogen monochloride gas decomposes. Write the skeleton, then balance it:

\_\_\_\_\_ → \_\_\_\_\_

42. Dinitrogen Pentoxide Decomposes into nitrogen and oxygen. Write the skeleton, then balance it:

\_\_\_\_\_ → \_\_\_\_\_

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43. Single Replacement reactions (SR) start with you...

44. Aqueous means \_\_\_\_\_.  
We will only use ionic compounds dissolved in water for these reactions.

45. Ionic compounds have \_\_\_\_\_ and \_\_\_\_\_

\_\_\_\_\_, that dissolve into water, AND they will \_\_\_\_\_ this way:

Example:

46. The salt disappears and dissolves. At the atomic level, the NaCl separates into positive and negative ions,

which swim in the water. This is a \_\_\_\_\_ of phase. \_\_\_\_ → \_\_\_\_

47. Water is \_\_\_\_\_.

48. Another ionic compound that dissolves and ionizes in water is SILVER NITRATE. Let's put some atoms of COPPER into that solution, which is a nice single replacement reaction set up.

\_\_\_\_\_ → \_\_\_\_\_

49. The copper...

50. Since the nitrate anion basically "hangs out" we call it the \_\_\_\_\_

51. A single replacement reaction always has \_\_\_\_\_ parts, the \_\_\_\_\_,  
the \_\_\_\_\_ and the \_\_\_\_\_.

52. 2 of these 3 are ALWAYS on one side of table J or the other side of table J.

In this reaction, see that both COPPER and SILVER are on the LEFT SIDE of Table J.

53. Copper is \_\_\_\_\_ than silver, so it \_\_\_\_\_  
the silver out and takes it's place in the solution.

54. Copper is MORE REACTIVE than silver, so it will bump the silver out of solution, and takes it's place dancing with the nitrate ion. Draw the reaction with the arrows to show that.

55. Single Replacement Reaction #2 Magnesium metal into HYDROCHLORIC ACID

But first let's look at table K, the acids.

Show how table salt ionizes in water \_\_\_\_\_

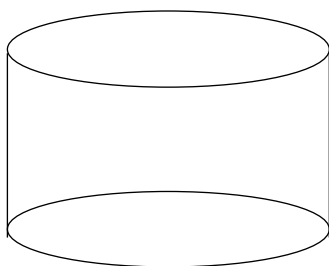
56. Show how  $\text{HCl}_{(G)}$  ionizes in water \_\_\_\_\_

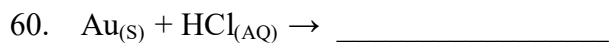
57. Show the skeleton for Magnesium metal into Hydrochloric Acid, then balance the equation

\_\_\_\_\_ → \_\_\_\_\_

58. State what happened (blue in the slide show)

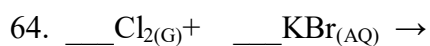
59. Draw the diagram



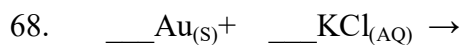
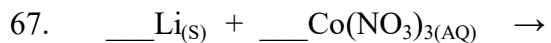
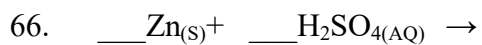


61. Why is there no reaction? \_\_\_\_\_

Balance these three SR reactions



65. That last one is special!



## Double Replacement Reactions

69. It takes \_\_\_\_\_ solutions to start a double replacement reaction.

70. The \_\_\_\_\_ with each other.

71. In the abstract: \_\_\_\_\_ → \_\_\_\_\_

72. The reaction occurs if a \_\_\_\_\_ forms in the products.

73. If no precipitate forms, a \_\_\_\_\_ formed, but no chemical reaction happened.

Copper (II) nitrate solution + ammonium carbonate solutions combine...

74. Write out the reactant side of this skeleton reaction to start. Write small! (underline just the cations)

\_\_\_\_\_ + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

Switch the cations/anions; FIX the products; Balance the equation; Check Table F to decide AQ or S.

What is table F? Let's look before we can finish this up. Label the tops of the four columns as shown.

75. Table F tells us if an ionic compound will be...

76. The second product here, the  $\text{CuCO}_3$  is \_\_\_\_\_

77. Make sure your #74 is PERFECTLY balanced and has FOUR phase symbols, that are correct now.

78. Second Word equation: Sodium chloride + lead (II) acetate solutions combine... (*finish this*)

into \_\_\_\_\_ and \_\_\_\_\_

79. and 80. Balance this word equation, with phase symbols now.

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Table F Practice now. Turn names into formulas, and decide if it will dissolve/ionize in water, or NOT.

81.	Compound	Formula	AQ or S ?
	Silver chloride		
	Magnesium nitrate		
	Sodium hydroxide		
	Strontium sulfate		
	Calcium nitrate		
	Barium acetate		
	Aluminum chlorate		
	Lead (II) bromide		
	Lithium sulfide		
	Ammonium chromate		
	Barium sulfate		

82. Potassium phosphate + calcium chloride solutions combine into... write out the reactant symbols, and then switch em', fix 'em, and table F 'em! Write small, ONE LINE!



What happened here?

## Combustion Reactions

84. Combustion reactions require a \_\_\_\_\_ compound to combine rapidly with \_\_\_\_\_ oxygen, forming \_\_\_\_\_ + \_\_\_\_\_ and lots of energy.

There is little challenge recognizing these reactions, and the products NEVER vary.

85. Hydrocarbon: a compound made of \_\_\_\_\_ + \_\_\_\_\_ only.

86. Every single combustion reaction looks like this:

\_\_\_\_\_

87. Examples of hydrocarbons include: \_\_\_\_\_

88. First practice example: the simplest of all hydrocarbons, methane combusts.  
We write out the skeleton reaction, then balance it...

\_\_\_\_\_ → \_\_\_\_\_

89. Balance these two in a row. Put coefficients on the dashes, do NOT write ones.



90. Sometimes we find ourselves BURNING (combusting) an OXYGENATED HYDROCARBON.

91. Combustion reactions require a hydrocarbon (*or oxygenated hydrocarbon*) to combine with oxygen, and  
ALWAYS forming: \_\_\_\_\_ and \_\_\_\_\_ + HEAT

92. Word Equation: Methanol + oxygen yields carbon dioxide & water

(Methanol is an alcohol, but NOT the “alcohol” in wine and beer) WRITE THE SKELETON

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93. Balance this equation.

94. Butane ( $C_4H_{10}$ ) combusts. WRITE THE SKELETON, balance this equation.

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95. Octane ( $C_8H_{18}$ ) combusts. WRITE THE SKELETON, balance this equation.

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Review of All Chemical Reactions...

96. Write out two balanced chemical equations with phase symbols for these two word equations.

Phosphorous + chlorine gas form into phosphorous pentachloride gas.

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Manganese VII oxide forms manganese and oxygen gas

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Write out the balanced chemical equations for these set ups for SINGLE REPLACEMENT REACTIONS

97. Sodium goes into silver nitrate solution

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98. Bromine is added to lithium iodide solution

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99. Tin is added to barium nitrate solution

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Write out the balanced chemical equations for these set ups for DOUBLE REPLACEMENT REACTIONS

100. Lithium nitrate and potassium chloride solutions are poured together

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101. Lead (II) hydrogen carbonate and Cobalt (III) sulfate solutions are poured together

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Write out the balanced chemical equations for these COMBUSTION REACTIONS

102. Hexane combusts ( $C_6H_{14}$ )

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103. Propanol combusts ( $C_3H_7OH$ ) this is a type of alcohol.

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