

3 • What Happens When Chemicals Are Put Together?

1 • COMBUSTION REACTIONS

Write the balanced chemical equations for the combustion of the following fuels:

propane, C_3H_8

butane, C_4H_{10}

ethanol, C_2H_5OH

decane, $C_{10}H_{22}$

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2 • REACTION TERMS

There are several terms used throughout this unit.

Answer the questions with these terms:

solid, liquid, gas, aqueous, reactants, products, subscripts, coefficients, oxidation, reduction

Consider the following balanced chemical equation: $C_3H_8(g) + 5 O_2(g) \rightarrow 3 CO_2(g) + 4 H_2O(l)$

1. The “8” in the equation is an example of a _____.
2. The “5” in the equation is an example of a _____.
3. $C_3H_8(g)$ and $O_2(g)$ are called _____.
4. The only liquid in the equation is _____.

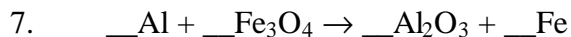
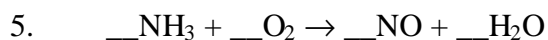
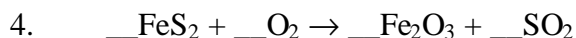
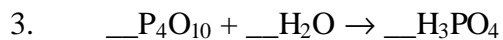
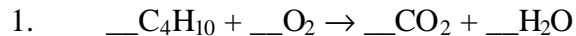
Consider the following balanced chemical equation: $Zn(s) + 2 HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$

5. Which chemicals are dissolved in water? _____ and _____.
6. The change of $Zn(s) \rightarrow Zn^{2+}(aq)$ is called _____ (oxidation / reduction).

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3 • BALANCING EQUATIONS

Balance the following equations:

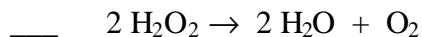
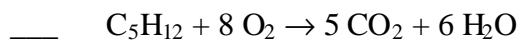
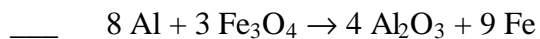
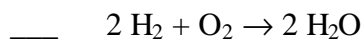
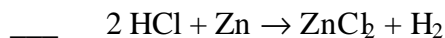


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4 • CLASSIFYING REACTIONS

For each of the following equations, classify the reaction as:

C—combustion	DR—double replacement	SR—single replacement	S—synthesis	D—decomposition
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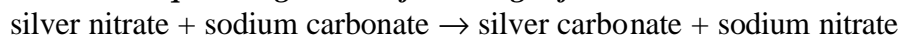
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5 • PRECIPITATION REACTIONS

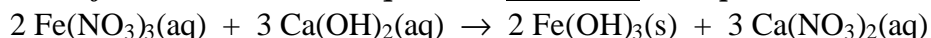
Circle the compounds below that would be precipitates (compounds that do not dissolve in water):

$K_2Cr_2O_7$	$Fe(NO_3)_3$	$CuOH$	$MgCO_3$
Ag_3PO_4	$BaSO_4$	$PbCl_2$	$CaCl_2$

Write the balanced molecular equation given the following information:



Write the ionic equation from this molecular equation. Underline the "spectator ions."



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6 • IONIC COMPOUNDS

Write the compound formed from these ions:

# Cations	Cation	# Anions	Anion	Formula
2	NH_4^+	1	SO_4^{2-}	
2	Fe^{3+}	3	S^{2-}	
1	Cu^{2+}	2	$C_2H_3O_2^-$	

Determine the # of ions needed to make a neutral compound and then write the formula:

# Cations	Cation	# Anions	Anion	Formula
	NH_4^+		PO_4^{3-}	
	Ba^{2+}		NO_3^-	
	Al^{3+}		CO_3^{2-}	
	Sr^{2+}		OH^-	

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7 • NAMING ACIDS

Write the formula of the acid formed from the following anions.

anion	acid formula
Cl ⁻	
OH ⁻	
S ²⁻	

anion	acid formula
SO ₄ ²⁻	
PO ₄ ³⁻	
C ₂ H ₃ O ₂ ⁻	

anion	acid formula
MnO ₄ ⁻	
F ⁻	
NO ₃ ⁻	

Name the following acids:

formula	acid name
HBr	
HNO ₃	
HC ₂ H ₃ O ₂	

formula	acid name
HI	
H ₂ Cr ₂ O ₇	
HClO ₃	

formula	acid name
H ₂ CO ₃	
H ₂ S	
H ₃ PO ₄	

Given the anion, write the formula of the acid and then name it:

anion	formula	acid name
S ²⁻		
Cl ⁻		
NO ₃ ⁻		
C ₂ H ₃ O ₂ ⁻		

anion	formula	acid name
SO ₄ ²⁻		
ClO ₃ ⁻		
F ⁻		
CO ₃ ²⁻		

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8 • CHEMICAL MATH

Consider the following balanced equation: $C_3H_8(g) + 5 O_2(g) \rightarrow 3 CO_2(g) + 4 H_2O(g)$
 Molar Masses: 45.01 32.00 44.01 18.02 g/mol

1. What mass of CO₂ is formed when 100 grams of C₃H₈ react?

2. What volume (at STP) of O₂(g) is needed to completely react with 7.55 grams of C₃H₈?

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9 • NATURAL HISTORY OF AIRS

Match the following ideas with the three gases:

O – oxygen gas

H – hydrogen gas

C – carbon dioxide gas

___1. formed from hydrogen peroxide + yeast

___2. also called “inflammable air”

___3. formed from vinegar + chalk

___4. also called “dephlogisticated air”

___5. formed from hydrochloric acid + zinc

___6. also called “fixed air”

___7. turns limewater cloudy

___8. pops with a burning splint

___9. glowing splint re-lights

Match these substances with their chemical formulas:

___10. chalk

___11. limewater

___12. vinegar

___13. hydrochloric acid

___14. hydrogen peroxide

a) HCl

b) CaCO₃

c) Ca(OH)₂

d) H₂O₂

e) HC₂H₃O₂