

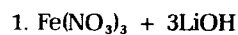
Name _____

Class _____ Date _____

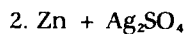
Chemical Reactions

A. Conservation of Mass and Atoms

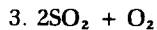
The total number of atoms of each kind must remain the same in a chemical reaction. How many atoms of each kind should be present among the product molecules and formula units in reactions involving the following reactants?



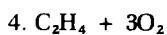
Number of Fe atoms	<u>1</u>
Number of N atoms	<u>3</u>
Number of O atoms	<u>9+3 = 12</u>
Number of Li atoms	<u>3</u>
Number of H atoms	<u>3</u>



Number of Zn atoms	<u>1</u>
Number of Ag atoms	<u>2</u>
Number of S atoms	<u>1</u>
Number of O atoms	<u>4</u>



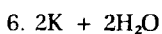
Number of S atoms	<u>2</u>
Number of O atoms	<u>4+2 = 6</u>



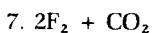
Number of C atoms	<u>2</u>
Number of H atoms	<u>4</u>
Number of O atoms	<u>6</u>



Number of N atoms	<u>4</u>
Number of H atoms	<u>8+2 = 10</u>
Number of O atoms	<u>6</u>
Number of S atoms	<u>1</u>



Number of K atoms	<u>2</u>
Number of H atoms	<u>4</u>
Number of O atoms	<u>2</u>

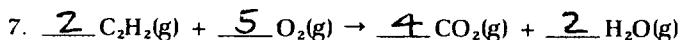
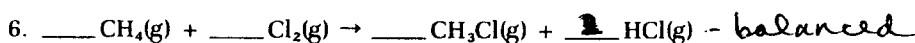
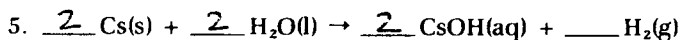
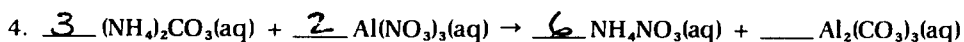
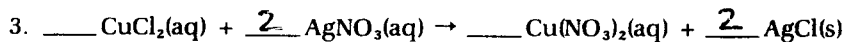
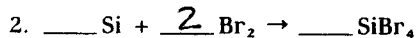


Number of F atoms	<u>4</u>
Number of C atoms	<u>1</u>
Number of O atoms	<u>2</u>

B. Balancing Equations by Writing Coefficients

A balanced chemical equation contains equal numbers of each kind of atom on both sides of the equation. In balancing equations, only coefficients—never subscripts—may be changed.

Balance the following equations by filling in the proper coefficients before the given formulas.



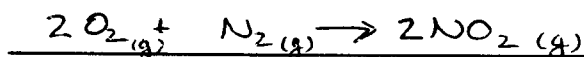
C. Writing Balanced Equations by Writing Formulas

Descriptions, in words, of chemical reactions can be translated into balanced equations only after correct formulas have been written for each of the substances involved. This can be done by referring to the periodic table and to lists of polyatomic ions to determine charges, and then indicating sufficient charged atoms of each kind to assure a net charge of zero for each substance. After this is done, coefficients are then written to balance the numbers of atoms.

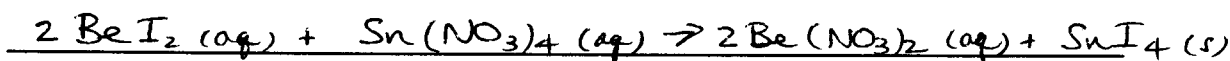
Write balanced chemical equations for reactions involving the following substances. Refer to a periodic table and to the following table of polyatomic ions.

POLYATOMIC IONS	
NAME OF ION	FORMULA AND CHARGE
ammonium	NH ₄ ⁺
carbonate	CO ₃ ²⁻
chlorate	ClO ₃ ⁻
hydroxide	OH ⁻
nitrate	NO ₃ ⁻
phosphate	PO ₄ ³⁻
sulfate	SO ₄ ²⁻

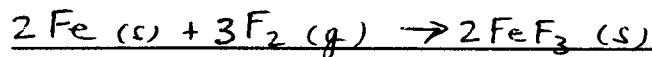
1. oxygen gas plus nitrogen gas, to give nitrogen dioxide gas



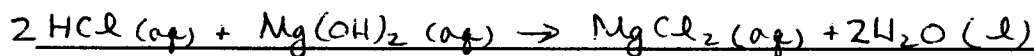
2. aqueous beryllium iodide plus aqueous tin(IV) nitrate, to give aqueous beryllium nitrate and solid tin(IV) iodide



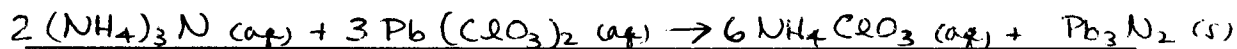
3. solid iron plus fluorine gas, to give solid iron(III) fluoride



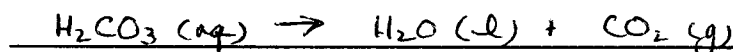
4. aqueous hydrogen chloride plus aqueous magnesium hydroxide, to give aqueous magnesium chloride and liquid water



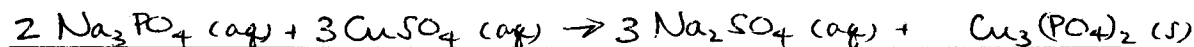
5. aqueous ammonium nitrate plus aqueous lead(II) chlorate, to give aqueous ammonium chlorate and solid lead(II) nitrate



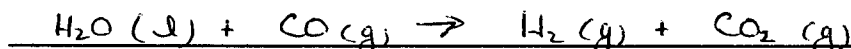
6. aqueous hydrogen carbonate, to give liquid water and carbon dioxide gas



7. aqueous sodium phosphate plus aqueous copper(II) sulfate, to give aqueous sodium sulfate and solid copper(II) phosphate



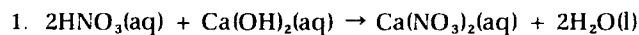
8. liquid water plus carbon monoxide gas, to give hydrogen gas and carbon dioxide gas



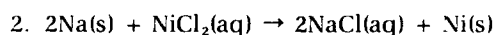
D. Classifying Reactions

Reactions can be classified into different types. These include: *synthesis* (in which simpler substances combine to form more complex ones), *decomposition* (in which complex substances are broken down to produce simpler ones), *combustion* (in which a substance combines with oxygen and releases a large amount of energy), *single replacement* (in which one element replaces another in a compound), *double replacement* (in which elements in compounds in a solution replace each other), and *water-forming* reactions (in which water is one of the products).

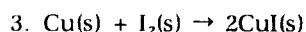
Classify each of the following reactions as one of the above types.



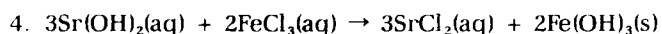
Type: water-forming



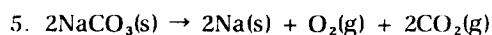
Type: single replacement



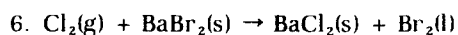
Type: synthesis



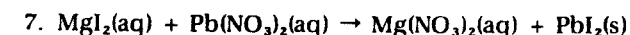
Type: double replacement



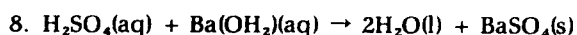
Type: decomposition



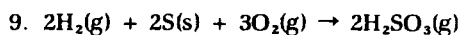
Type: single replacement



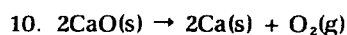
Type: double replacement



Type: water-forming



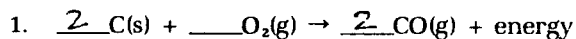
Type: synthesis or combustion



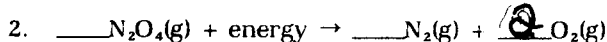
Type: decomposition

E. Energy in Chemical Reactions

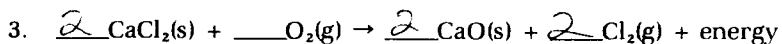
Chemical reactions can be classified on the basis of whether they absorb or release energy. Study the placement of the energy terms in each of the following and state whether the reaction is *endothermic* or *exothermic*. Also, write in coefficients to balance each equation.



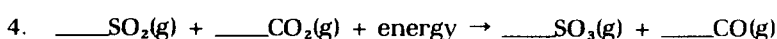
Type: exothermic



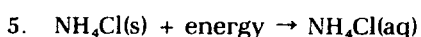
Type: endothermic



Type: exothermic



Type: endothermic



Type: endothermic

F. Reaction Word Scramble

Use the clues provided to help unscramble the letters below to form words related to Chapter 5. The letters in the circles will spell out the name of an element.

CLUES

1. Energy-releasing reaction
2. Energy-absorbing reaction
3. Reaction involving formation of more complex product
4. Commonly occurring compound
5. Kind of replacement reaction
6. Reaction involving formation of less complex product
7. Another kind of replacement reaction
8. Remains constant during a reaction

1. X O E E H M C T I R

E X O (T) H E R M I C

2. I D O H R C N T E M E

E N D O T H E R M (I) C

3. N H I S E T Y S S

S (Y) N T H E S I S

4. A E R W T

W (A) T E R

5. E N L S G I

S (N) G L E

6. N T D O O C P S E M I I O

D E C O M P O S (I) T I O N

7. D L O E U B

D O (U) B L E

8. S A S M

(M) A S S

Name of element: TITANIUM