High School Chemistry

2019 - 2020

Five Day Instruction

HMH TX https://my.hrw.com

Week 1

Day	Worksheet Title
1	Bonding and Chemical Reactions: Name ionic compounds …
2	Bonding and Chemical Reactions: Write Chemical Formulas …
3	Bonding and Chemical Reactions: Construct Electron Dot Formulas …
4	Bonding and Chemical Reactions: Describe the nature of metallic bonding …
5	Bonding and Chemical Reactions: Predict molecular structure for molecules …

Name_____ Date_____

TEKS 3.C.7.A Chemistry

BONDING AND CHEMICAL REACTIONS

The student will demonstrate an understanding of how atoms form bonds and can qualify the changes that occur during chemical reactions.

(C.7) **Science concepts.** The student knows how atoms form ionic, metallic, and covalent bonds. The student is expected to (A) name ionic compounds containing main group or transition metals, covalent compounds, acids, and bases, using International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules;

STANDARD REVIEW

Binary ionic compounds contain ions of two elements, a metal and a nonmetal. Naming binary ionic compounds is simple. The name is made up of just two words: the name of the cation followed by the name of the anion. Simple cations borrow their names from the names of the elements. For example, K^+ is known as the potassium ion, and Zn^{2+} is known as the zinc ion. When an element forms two or more ions, the ion names include roman numerals to indicate charge. In the case of copper, Cu, the names of the two ions are written as Cu^+ copper(I) ion and Cu^{2+} copper(II) ion. When we read the names of these ions out loud, we say "copper one ion" or "copper two ion." The name of a simple anion is also formed from the name of the element, but it ends in -ide. Thus, Cl^- is the chloride ion, O^{2-} is the oxide ion, and P^{3-} is the phosphide ion. Unlike simple ions, polyatomic ions are made of atoms of more than one element. Like simple ions, polyatomic ions have a positive or negative charge. This charge is not found on any single atom. Instead, it is spread across this group of atoms, which are bonded together. Many polyatomic ions contain oxygen. The ion with more oxygen takes the "-ate" ending. For example, the polyatomic ion SO_3^{2-} is called the "sulfite" ion, while the polyatomic ion SO_4^{3-} is the "sulfate" ion. The presence of hydrogen is often indicated by an ion's name starting with hydrogen.

Covalent compounds made of two elements are named by using a method similar to the one used to name ionic compounds. Think about how the covalent compound SO_2 is named. The first element named is usually the first one written in the formula, in this case sulfur. Sulfur is the less-electronegative element. The second element named has the ending "-ide," in this case, "oxide." Prefixes are used to show the number of atoms of each element in the molecule. They are added to the first element in the name only if the molecule contains more than one atom of that element. So, N_2O is named dinitrogen oxide, S_2F_{10} is named disulfur decafluoride, and P_4O_6 is named tetraphosphorus hexoxide.

Name_____ Date_____

TEKS 3.C.7.A Chemistry

STANDARD PRACTICE

1 What is the name of the compound shown by the formula P_2O_5?

A Phosphorus oxide

B Diphosphorus oxide

C Phosphorus pentoxide

D Diphosphorus pentoxide

2 What is the name of the compound whose formula is Fe_2O_3?

A Iron oxide

B Diiron trioxide

C Iron(II) oxide

D Iron(III) oxide

3 What is the name of the compound K_2SO_4?

A Dipotassium sulfate

B Potassium sulfate

C Potassium sulfide

D Potassium sulfite

4 What is the name of the compound that has the formula $Ca(NO_3)_2$?

A Calcium nitrate

B Calcium dinitrate

C Calcium(II) nitrate

D Calcium nitrogen trioxide

Name_____ Date_____

TEKS 3.C.7.B Chemistry

BONDING AND CHEMICAL REACTIONS

The student will demonstrate an understanding of how atoms form bonds and can qualify the changes that occur during chemical reactions.

(C.7) **Science concepts.** The student knows how atoms form ionic, metallic, and covalent bonds. The student is expected to (B) write the chemical formulas of common polyatomic ions, ionic compounds containing main group or transition metals, covalent compounds, acids, and bases;

STANDARD REVIEW

A chemical formula tells you which elements, as well as how many of each, are present in a compound. The formula KBr shows that the compound is made up of potassium and bromide ions in a 1:1 ratio. The formula H_2O shows that water is made up of hydrogen and oxygen atoms in a 2:1 ratio.

To write the formula of an ionic compound, you need to know the anion and the cation. Ionic compounds never have an excess of positive or negative charges. To maintain this balance, the total positive and negative charges must be the same. If the charges on the ions are the same magnitude, the formula will show a 1:1 ratio, for example, NaCl and ZnS. You must take care when writing the formula for an ionic compound for which the charges of the cation and anion differ. Consider the example of magnesium nitride. The magnesium ion, Mg^{2+}, has two positive charges, and the nitride ion, N^{3-}, has three negative charges. The formula for magnesium nitride is Mg_3N_2, six positive and six negative charges.

To write the formula of a binary ionic compound:

- Write the symbol and charges for the cation and anion. For example, iron(III) and oxide are Fe^{3+} and O^{2-}.
- Write the symbols for the ions side by side, beginning with the cation: $Fe^{3+}O^{2-}$.
- Find the lowest common multiple of the charges on the ions, six for 3^+ and 2^-.
- For six positive charges, you need two Fe^{3+} ions; for six negative charges, you need three O^{2-}. The formula is written Fe_2O_3.

For formulas that contain more than one polyatomic ion, the atoms in the ion are placed in parentheses and the subscript appears outside the parentheses. Example: $Pb(NO_3)_2$.

The formulas for inorganic acids follow the same rules, using the hydrogen ion, H^+, as the cation. Inorganic bases follow the same rules, using the hydroxide ion, OH^-, as the anion.

To write the formulas of binary covalent compounds, write the symbols of the elements in the order in which they appear in the name. Then add to each element the subscript that corresponds to the prefix in the name.

Name_____ Date_____

TEKS 3.C.7.B Chemistry

STANDARD PRACTICE

1 What is the formula for the compound dinitrogen pentaoxide?

A N_2P_5

B N_5P_2

C N_2O_5

D N_5O_2

2 What is the correct formula for magnesium hydroxide?

A HOMg

B MgOH

C $MgOH_2$

D $Mg(OH)_2$

3 Which of these formulas correctly represents copper(II) chloride?

A CuCl

B Cu_2Cl

C $CuCl_2$

D Cu_2Cl_2

4 What is the correct formula for Mn(IV) phosphate (the phosphate ion is PO_4^{3-})?

A $Mn_3(PO_4)_4$

B $Mn_4(PO_4)_3$

C Mn_3PO_4

D $Mn(PO_4)_3$

Name_____ Date_____

TEKS 3.C.7.C Chemistry

BONDING AND CHEMICAL REACTIONS

The student will demonstrate an understanding of how atoms form bonds and can qualify the changes that occur during chemical reactions.

(C.7) **Science concepts.** The student knows how atoms form ionic, metallic, and covalent bonds. The student is expected to (C) construct electron dot formulas to illustrate ionic and covalent bonds.

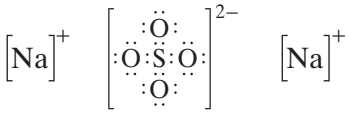
STANDARD REVIEW

Lewis Structures for Molecules. Covalent bond formation usually involves only the electrons in an atom's outermost energy levels, or the atom's valence electrons. Electron-dot notation is an electron-configuration notation in which only the valence electrons of an atom of a particular element are shown, indicated by dots placed around the element's symbol. The inner-shell electrons are not shown. Two forms of electron-dot structures for hydrogen and fluorine molecules are:

The pair of dots between elements' symbols represents the shared pair of electrons in the covalent bond. In addition, each fluorine atom is surrounded by three pairs of electrons that are not shared in bonds. Alternatively, the pair of dots representing a shared pair of electrons in a covalent bond can be replaced by a long dash. These formula representations are all Lewis structures. It is common to write Lewis structures that show only the electrons that are shared, using dashes to represent the bonds. Multiple bonds can be shown by multiple pairs of dots or lines.

Lewis Structures for Ionic Compounds. Ionic compounds do not share electrons, so the Lewis structure must show a transfer of electrons. To show this, each ion is drawn separately in brackets and the charge is shown outside the brackets. The drawings for the ions are then placed side by side.

Polyatomic Ions. Polyatomic ions consist of two or more atoms bound by covalent bonds with a charge on the group of atoms. The Lewis structure of a polyatomic ion places the group of atoms in a bracket with the charge outside to indicate that it is an ion. Within the brackets, the total number of electrons is indicated by dots that show the shared electrons and electron pairs. Add an electron for each negative charge and subtract an electron for each positive charge.



Name_____ Date_____

TEKS 3.C.7.C Chemistry

STANDARD PRACTICE

1 Which of these shows a correct Lewis structure?

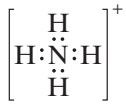
A 

B 

C 

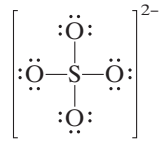
D 

2 Which of the following Lewis structures shows a molecule that has double bonds?

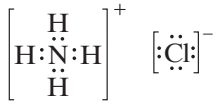
A 

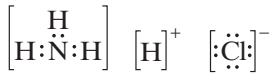
B 

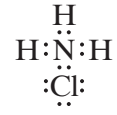
C 

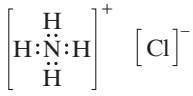
D 

3 Which of these is the correct Lewis structure for ammonium chloride?

A 

B 

C 

D 

4 Why does a Lewis structure of a covalent molecule show only the valence electrons?

A There is not enough room to show all of the electrons.

B Only valence electrons have enough charge to attract other atoms.

C Only valence electrons are involved in chemical bonds.

D Only shared electrons are shown, and all shared electrons are valence electrons.

Name_____ Date_____

TEKS 3.C.7.D Chemistry

BONDING AND CHEMICAL REACTIONS

The student will demonstrate an understanding of how atoms form bonds and can qualify the changes that occur during chemical reactions.

(C.7) **Science concepts.** The student knows how atoms form ionic, metallic, and covalent bonds. The student is expected to (D) describe the nature of metallic bonding and apply the theory to explain metallic properties such as thermal and electrical conductivity, malleability, and ductility;

STANDARD REVIEW

The properties of materials are determined by the types of bonds that hold atoms together. The common properties of metals, such as electrical and thermal conductivity, malleability, and ductility, all come from a bond type shared by all metals. The metallic crystal structure consists of metal cations surrounded by a sea of delocalized valence electrons. The electrons come from the metal atoms, but they belong to the crystal as a whole. The freedom of these delocalized electrons to move throughout the crystal explains the properties of metals.

Metals, such as copper, are very good electric conductors in the solid state. Because the electrons in a metallic bond are not held tightly by any single atom's nucleus, they move freely throughout the entire substance. When a negative charge is applied to one part of the metal, free electrons immediately move away from the negative charge due to electrical repulsion. The movement of each electron pushes other electrons, creating a current of moving negative charges. Thermal conductivity is also caused by the free movement of electrons. As the electrons gain energy, they are able to transfer it rapidly to other electrons moving through the metal and to move toward areas where there is less energy. In general, metals are solids at room temperature. Because the electrons move freely throughout a piece of metal, there is no directional component to the metallic bonds. Particles are simultaneously attracted to oppositely charged particles in every direction. That is why metals are malleable and ductile. That is, they can be easily pounded or pulled into different shapes.

Name_____ Date_____

TEKS 3.C.7.D Chemistry

STANDARD PRACTICE

1 Metals are malleable and ductile. What do these properties indicate about the bonds that hold metal atoms together?

A Metallic bonds are very weak.

B The bonds between metals are easily broken by heat.

C Metal atoms do not ionize when they form metallic bonds.

D The bonding is the same in all directions throughout the metal.

2 Which of the following pairs of elements would form a substance that is held together by metallic bonds?

A Sodium and chlorine

B Magnesium and sulfur

C Copper and zinc

D Lead and nitrogen

3 What physical property of materials depends on the ability of electrons to move easily?

A Solubility in water

B Electrical conductivity

C Low melting point

D Brittleness

4 The electron structure of aluminum is $1s^2 2s^2 2p^6 3s^2 3p^1$. How many electrons does each aluminum atom contribute to the metallic bonds in a piece of aluminum foil?

Name_____ Date_____

TEKS 3.C.7.E Chemistry

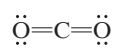
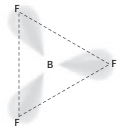
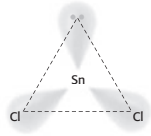
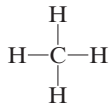
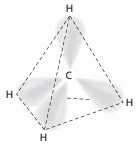
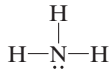
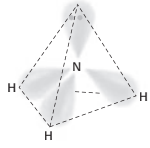
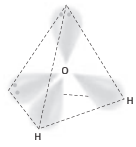
BONDING AND CHEMICAL REACTIONS

The student will demonstrate an understanding of how atoms form bonds and can qualify the changes that occur during chemical reactions.

(C.7) **Science concepts.** The student knows how atoms form ionic, metallic, and covalent bonds. The student is expected to (E) predict molecular structure for molecules with linear, trigonal planar, or tetrahedral electron pair geometries using Valence Shell Electron Pair Repulsion (VSEPR) theory.

STANDARD REVIEW

The valence shell electron pair repulsion (VSEPR) theory provides a model that can be used to predict the shape of a molecule. VSEPR uses Lewis structures of the molecule. According to the VSEPR theory, the shape of a molecule is determined by the valence electrons surrounding the central atom. Electron pairs in bonds and unshared pairs repel each other and remain as far apart as possible.

Example	Lewis Structure	Shape	Model
carbon dioxide CO_2		linear	
boron trifluoride BF_3		trigonal planar	
tin(II) chloride $SnCl_2$		bent	
methane CH_4		tetrahedral	
ammonia NH_3		trigonal pyramidal	
water H_2O		bent	

Name_____ Date_____

TEKS 3.C.7.E Chemistry

In carbon dioxide, CO_2, there are two groups of electrons, each associated with an oxygen atom, that line up on opposite sides of the carbon atom, forming a linear atom.

The Lewis structure for boron trifluoride, BF_3, shows that the boron atom is surrounded by three shared pairs. There are three single bonds around the central boron atom. The three F atoms, each of which has three unshared pairs, will repel each other and will be a maximum distance apart. This molecular shape is known as trigonal planar. Like the boron in BF_3, the tin atom in tin (II) chloride, $SnCl_2$, is surrounded by three pairs of electrons. However, one of the pairs is an unshared electron pair. Although the three groups are arranged in a trigonal shape, the atoms of the molecule form a bent shape.

When the central atom is surrounded by four pairs of electrons, they are arranged in a tetrahedral pattern, which keeps them as far apart as possible. A methane molecule has four carbon-hydrogen bonds, which form a tetrahedral shape around the carbon. However, in ammonia there are only three bonds and one unshared pair of electrons. The pattern of the atoms in the ammonia molecule is a pyramid with the nitrogen atom at the apex. In water, the oxygen is surrounded by four electron pairs in a tetrahedral arrangement, but because two of the pairs are unshared, the water molecule is bent in one plane.

Name_____ Date_____

TEKS 3.C.7.E Chemistry

STANDARD PRACTICE

1 Based on VSEPR, what is the shape of a molecule of carbon tetrachloride, CCl_4?

A Bent

B Trigonal pyramidal

C Trigonal planar

D Tetrahedral

2 According to VSEPR and the periodic table, what is the shape of a molecule of antimony tribromide, $SbBr_3$?

A Bent

B Trigonal pyramidal

C Trigonal planar

D Tetrahedral

3 Based on VSEPR, what is the shape of a molecule of hydrogen sulfide, H_2S?

A Bent

B Trigonal pyramidal

C Trigonal planar

D Tetrahedral

4 What is the shape of the ammonium ion, $(NH_4)^+$, according to VSEPR?

A Bent

B Trigonal pyramidal

C Trigonal planar

D Tetrahedral

High School Chemistry

2019 - 2020

Five Day Instruction

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Week 2

Day	Worksheet Title
1	Bonding and Chemical Reactions: Define and use the concept of a mole
2	Bonding and Chemical Reactions: Use the mole concept to calculate …
3	Bonding and Chemical Reactions: Calculate percent composition and empirical and molecular formulas
4	Bonding and Chemical Reactions: Use the Law of Conservation of mass to write and balance chemical equations
5	Bonding and Chemical Reactions: Perform stoichiometric calculations …

Name_____ Date_____

TEKS 3.C.8.A Chemistry

BONDING AND CHEMICAL REACTIONS

The student will demonstrate an understanding of how atoms form bonds and can qualify the changes that occur during chemical reactions.

(C.8) **Science concepts.** The student can quantify the changes that occur during chemical reactions. The student is expected to (A) define and use the concept of a mole;

STANDARD REVIEW

The mole is the SI unit for amount of substance, containing as many particles as there are atoms in exactly 12 g of carbon-12. The abbreviation for 1 mole is 1 mol. This number is approximately 6.02×10^{23}. The mole is a counting unit, just like a dozen.

Because the mole is a counting unit, you can calculate in moles using mathematical operations. For example, a molecule of methane, CH_4, has 5 atoms. How many atoms are there in 1 mol of methane molecules? You can find the answer by multiplying the number of moles of molecules by the number of atoms in a molecule:

$1 \text{ mol} \times 6.02 \times 10^{23} \text{ molecules/mol} \times 5 \text{ atoms/molecule} = 30.1 \times 10^{23} \text{ atoms or } 3.01 \times 10^{24} \text{ atoms}$

An alternative definition of mole is the amount of a substance that contains Avogadro's number of particles. The mass of one mole of a pure substance is called the molar mass of that substance. Molar mass is usually written in units of g/mol. The molar mass of an element is numerically equal to the atomic mass of the element in atomic mass units (u). The mass of one helium atom is 4.0 u. The mass of one mole of helium is 4.0 grams.

Name_____ Date_____

TEKS 3.C.8.A Chemistry

STANDARD PRACTICE

1 Which number below is the same as 4 moles?

A 1.5×10^{23}

B 2.4×10^{23}

C 1.5×10^{24}

D 2.4×10^{24}

2 How many molecules are there in 2 mol of O_2?

A 1.5×10^{23}

B 1.2×10^{24}

C 1.5×10^{24}

D 2.4×10^{24}

3 How many moles of atoms are there in 4 grams of H_2?

A 1 mol

B 2 mol

C 4 mol

D 1.2×10^{24} mol

4 The mass of a nitrogen atom is 14 u. What is the mass, in grams, of 2 mol of N_2?

Name_____ Date_____

TEKS 3.C.8.B Chemistry

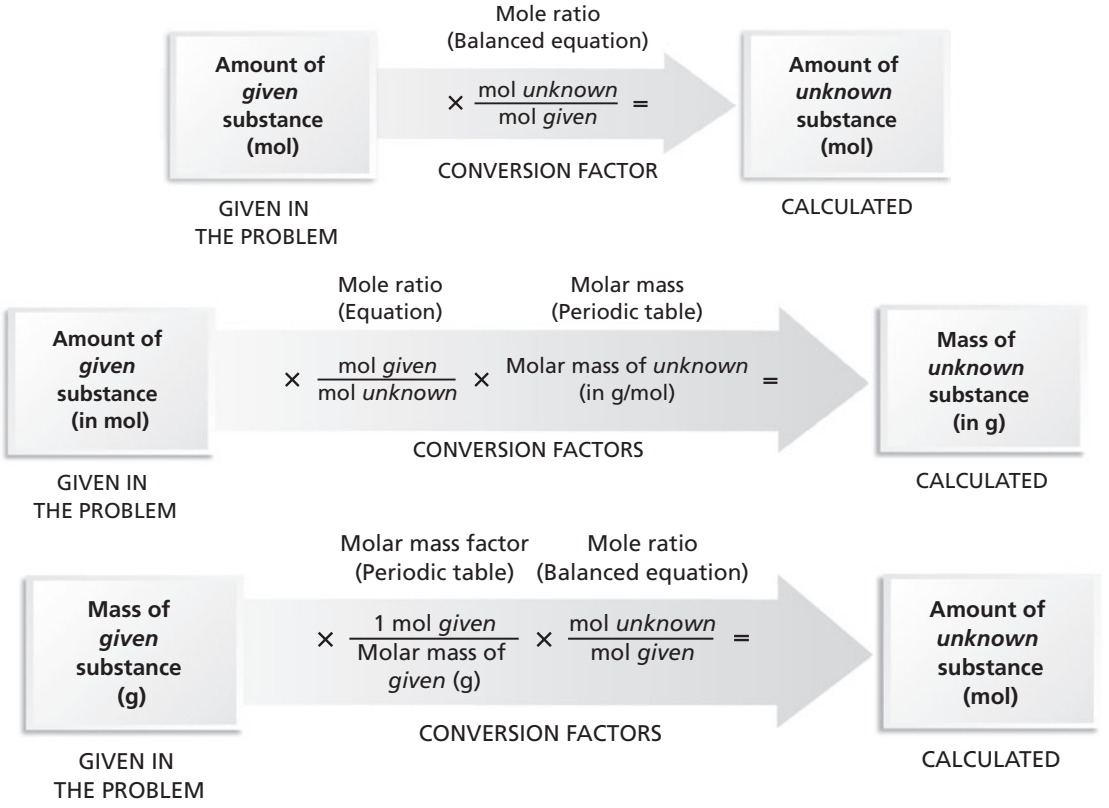
BONDING AND CHEMICAL REACTIONS

The student will demonstrate an understanding of how atoms form bonds and can qualify the changes that occur during chemical reactions.

(C.8) **Science concepts.** The student can quantify the changes that occur during chemical reactions. The student is expected to (B) use the mole concept to calculate the number of atoms, ions, or molecules in a sample of material;

STANDARD REVIEW

The mass of a system remains constant during any chemical process. The *mole* is the SI unit for amount of substance, containing as many particles as there are atoms in exactly 12 g of carbon-12. The mole is a counting unit, just like a dozen. An alternative definition of mole is the amount of a substance that contains Avogadro's number of particles. The mass of one mole of a pure substance is called the molar mass of that substance. Molar mass is usually written in units of g/mol. The molar mass of an element is numerically equal to the atomic mass of the element in atomic mass units. Reaction stoichiometry involves the mass relationships between reactants and products in a chemical reaction. Reaction stoichiometry uses the law of conservation of mass and the molar masses of reactants and products to determine the quantities of chemicals involved in reactions.



Name_____ Date_____

TEKS 3.C.8.B Chemistry

STANDARD PRACTICE

1 The atomic mass of bromine is 79.904 u. If a chemist finds that the mass of a sample of bromine gas, Br_2, is 79.904 g, how many moles of Br_2 are present?

A 0.500 mol

B 1.000 mol

C 1.500 mol

D 79.904 mol

2 Copper has a molar mass of 63.55 g/mol. How many particles are in 20 g of copper?

A 1.90×10^{23}

B 6.02×10^{23}

C 1.91×10^{24}

D 6.34×10^{24}

3 The atomic mass of iodine is 127 u. How many molecules of iodine are there in 127 grams of I_2?

A 1.50×10^{23}

B 3.01×10^{23}

C 6.02×10^{23}

D 3.01×10^{24}

4 Molybdenum has a molar mass of 95.94 g/mol. How many moles of molybdenum atoms are present in 150.0 g of molybdenum?

Name_____ Date_____

TEKS 3.C.8.C Chemistry

BONDING AND CHEMICAL REACTIONS

The student will demonstrate an understanding of how atoms form bonds and can qualify the changes that occur during chemical reactions.

(C.8) **Science concepts.** The student can quantify the changes that occur during chemical reactions. The student is expected to (C) calculate percent composition and empirical and molecular formulas;

STANDARD REVIEW

Percentage Composition: To find the mass percentage of an element in a compound, divide the mass of the element in a sample of the compound by the total mass of the sample and then multiply this value by 100.

$$\frac{\text{mass of element in sample}}{\text{mass of sample of compound}} \times 100 = \%\ \text{element in compound}$$

The mass percentage of an element in a compound is the same regardless of the sample's size. Therefore, a simpler way to calculate the percentage of an element in a compound is to determine how many grams of the element are present in one mole of the compound. Then divide this value by the molar mass of the compound and multiply by 100.

$$\frac{\text{mass of element in 1 mol of compound}}{\text{molar mass of compound}} \times 100 = \%\ \text{element in compound}$$

Empirical Formula: Experimental data frequently give the mass percentage of elements in a compound. This data can be used to calculate the simplest ratio among the atoms found in the compound. This simplest ratio is called the empirical formula of the compound. For some compounds, the empirical formula and the actual formula are the same. But for others, they are different. For example, the empirical formula of hydrogen peroxide, H_2O_2, is HO, a 1:1 ratio.

Molecular Formulas Are Multiples of Empirical Formulas: The formula for an ionic compound shows the simplest whole-number ratio of the large numbers of ions in a crystal of the compound. Molecular compounds, on the other hand, are made of single molecules. The molar mass of a compound is equal to the molar mass of the empirical formula times a whole number, *n*. There are several experimental techniques for finding the molar mass of a molecular compound even though the compound's chemical composition and formula are unknown. If you divide the experimental molar mass by the molar mass of the empirical formula, you can figure out the value of *n* needed to scale the empirical formula up to give the molecular formula.

Name_____ Date_____

TEKS 3.C.8.C Chemistry

STANDARD PRACTICE

1 The molar mass of iron is 55.8 g/mol, and the molar mass of oxygen is 16.0 g/mol. What is the percentage composition of iron(II) oxide, FeO?

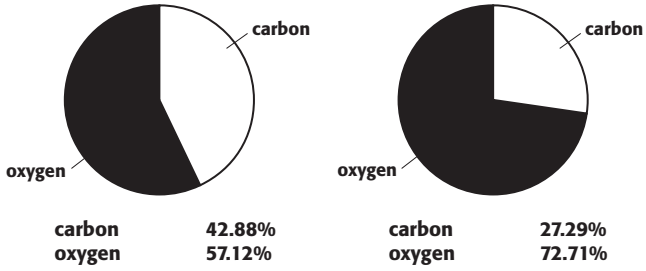
A 22.3% Fe, 77.7% O

B 50% Fe, 50% O

C 71.3% Fe, 28.7% O

D 77.7% Fe, 22.3% O

2 The illustration below shows the percentage composition of two compounds containing carbon and oxygen.



Which are the formulas of the two compounds illustrated above?

A CO and CO_2

B CO and CO_3

C CO_2 and CO_3

D CO and C_2O

3 What is the empirical formula of glucose, $C_6H_{12}O_6$?

A CHO

B CH_2O

C $C_2H_4O_2$

D $C_6H_{12}O_6$

4 To the nearest tenth of a percent, what is the percentage by mass of hydrogen in water?

Name_____ Date_____

TEKS 3.C.8.D Chemistry

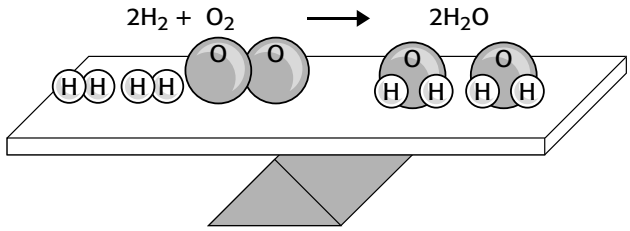
BONDING AND CHEMICAL REACTIONS

The student will demonstrate an understanding of how atoms form bonds and can qualify the changes that occur during chemical reactions.

(C.8) **Science concepts.** The student can quantify the changes that occur during chemical reactions. The student is expected to (D) use the law of conservation of mass to write and balance chemical equations;

STANDARD REVIEW

Atoms are never lost or gained in a chemical reaction. They are just rearranged. Every atom in the reactants becomes part of the products. When writing a chemical equation, the total number of atoms of each element in the reactants must equal the total number of atoms of that element in the products. This process is called balancing the equation.



The steps in balancing a chemical reaction are:

1. Identify reactants and products.
   - If no equation is provided, identify the reactants and products and write an unbalanced equation for the reaction.
   - If not all chemicals are described in the problem, try to predict the missing chemicals based on the type of reaction.
2. Count atoms.
   - Count the number of atoms of each element in the reactants and in the products, and record the results in a table.
   - Identify elements that appear in only one reactant and in only one product, and balance the atoms of those elements first. Delay the balancing of atoms (often hydrogen and oxygen) that appear in more than one reactant or product.
   - If a polyatomic ion appears on both sides of the equation, treat it as a single unit.
3. Insert coefficients.
   - Balance atoms one element at a time by inserting coefficients.
   - Count atoms of each element frequently as you try different coefficients.
   - Watch for elements whose atoms become unbalanced as a result of your work.
4. Verify your results.
   - Double-check to be sure that the numbers of atoms of each element are equal on both sides of the equation.

Name_____ Date_____

TEKS 3.C.8.D Chemistry

STANDARD PRACTICE

1 Which of the following equations is NOT balanced?

A $2ZnS + 3O_2 \rightarrow 2ZnO + SO_2$

B $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

C $Na_2SiF_6 + 4Na \rightarrow Si + 6NaF$

D $2NH_3 + 3CuO \rightarrow N_2 + 3Cu + 3H_2O$

2 Which chemical equation below correctly shows the conservation of matter?

A $C_5H_{12} + O_2 \rightarrow CO_2 + H_2O$

B $C_5H_{12} + 8O_2 \rightarrow 5CO_2 + 3H_2O$

C $C_5H_{12} + 8O_2 \rightarrow 5CO_2 + 6H_2O$

D $C_5H_{12} + 16O_2 \rightarrow 3CO_2 + 4H_2O$

3 How can the following equation be balanced?

$$(NH_4)_2Cr_2O_7 \rightarrow Cr_2O_3 + N_2 + H_2O$$

A Put a coefficient of 2 in front of Cr_2O_3.

B Put a coefficient of 4 in front of H_2O.

C Put a coefficient of 2 in front of Cr_2O_3 and H_2O.

D Put a coefficient of 8 in front of Cr_2O_3.

4 Aluminum reacts with phosphoric acid in a single-displacement reaction to produce aluminum phosphate and hydrogen gas according to the following reaction:

$$Al + H_3PO_4 \rightarrow AlPO_4 + H_2$$

When this equation is correctly balanced, what is the coefficient for H_2?

Name_____ Date_____

TEKS 3.C.8.E Chemistry

BONDING AND CHEMICAL REACTIONS

The student will demonstrate an understanding of how atoms form bonds and can qualify the changes that occur during chemical reactions.

(C.8) **Science concepts.** The student can quantify the changes that occur during chemical reactions. The student is expected to (E) perform stoichiometric calculations, including determination of mass relationships between reactants and products, calculation of limiting reagents, and percent yield.

STANDARD REVIEW

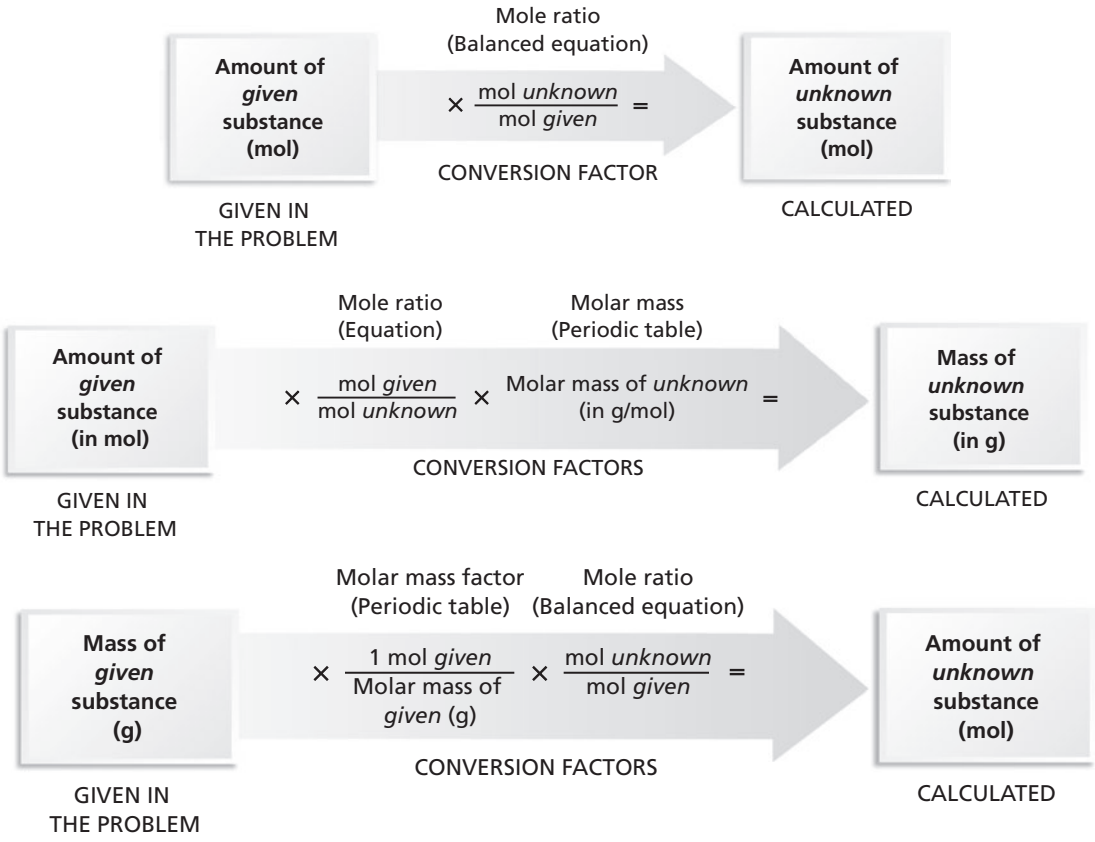
The law of conservation of mass, which is based on observations of many chemical reactions, states that matter is neither created nor destroyed during a chemical reaction. Therefore, the mass of a system remains constant during any chemical process.

The mole is the SI unit for amount of substance, containing as many particles as there are atoms in exactly 12 g of carbon-12. The mole is a counting unit, just like a dozen. An alternative definition of mole is the amount of a substance that contains Avogadro's number of particles. The mass of one mole of a pure substance is called the molar mass of that substance. Molar mass is usually written in units of g/mol. The molar mass of an element is numerically equal to the atomic mass of the element in atomic mass units.

Reaction stoichiometry involves the mass relationships between reactants and products in a chemical reaction. Reaction stoichiometry uses the law of conservation of mass and the molar masses of reactants and products to determine the quantities of chemicals involved in reactions.

Name_____ Date_____

TEKS 3.C.8.E Chemistry



Name_____ Date_____

TEKS 3.C.8.E Chemistry

STANDARD PRACTICE

1 The atomic mass of bromine is 79.904 u. If a chemist finds that the mass of a sample of bromine gas, Br_2, is 79.904 g, how many moles of Br_2 are present?

A 0.50000 mol

B 1.0000 mol

C 1.5000 mol

D 79.904 mol

2 The mass of a mole of sulfur atoms is 32.066 g. In a chemical reaction, 2.00 moles of sulfur produced sulfur dioxide gas, SO_2. What was the mass of the gas produced?

A 64 g

B 128 g

C 192 g

D 256 g

3 Sodium reacts with chlorine to form sodium chloride according to the following reaction:

$$2Na + Cl_2 \rightarrow 2NaCl$$

How many moles of Cl_2 react with 100 moles of sodium to form sodium chloride?

A 1

B 50

C 100

D 200

4 How many grams of oxygen are required to burn 10.0 g magnesium? The molar mass of O_2 is 32.0 g/mol, and the molar mass of Mg is 24.3 g/mol.

$$2Mg(s) + O_2 \rightarrow 2MgO(s)$$