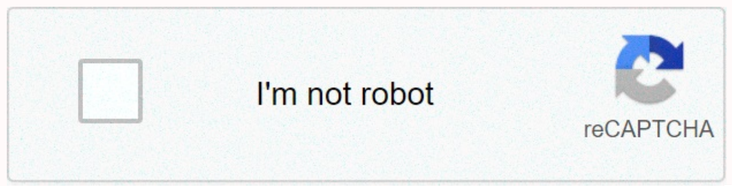

Continue

Chemistry 1 worksheet calculating formula mass

Name: _ You try to answer the question without referring to your textbook. If you are stuck, ask another group for help. 1. Use periodic tables to enter the chart below as the only source of additional information. Compound (Molecular Formula) Empirical Formula Mole Mass Mole 100.0 g H2O C2H5OH C6H6 BaSO4 2. The question #1 the percentage composition by the mass of each compound that is the same. The first compound was completed as an example. Compound percentage composition by mass H2O 88.8% O, 11.2% H C2H5OH C6H6 BaSO4 3. Chemical analysis typically generates percent-weight elemental data of elements present in pure samples of compounds. The analysis of pyrophosphoric acid produces the following data: 2.27% hydrogen, 34.80%, the rest is oxygen. a) What is the mass of each element present in the 100.0 g sample? You can divide groups into pairs and assign one element to each pair. H _ H _ It can be found by dividing the number of moles of each element by the number of moles of the least number of moles. The results provide an empirical formula for pyro-acid. H _ What is molecular formula? 4. Vitamin C is an antioxidant. This class of compounds is important in biochemistry partly because antioxidants develop from the burning of negative and pure samples of the effects of potentially harmful oxidizing substances in the body such as single oxygen and free radicals. 35.5 mg of vitamin C samples were placed in the combustion device, 53.3 mg CO 2 and 14.4 mg H 2O was recovered. Use a group brainstorming approach to resolve parts (a) through (d). a) Identify reactants and products to create unbalanced chemical equations. The equation cannot yet be balanced because vitamin C can only be represented by CxHyOz, an integer that X, y, and z will be determined in the later stages of troubleshooting. b) What is the source of carbon's response in carbon dioxide products? _ _ _ e) How many carbon moles were in the original vitamin C sample? f) How many moles of hydrogen g) How much oxygen was in the sample? h) What is the mole ratio of hydrogen and oxygen to carbon of vitamin C? i) What is the empirical formula of vitamin C? j) Vitamin C has a dorsi acid mass of 176 g/mol. What is molecular formula? In other words, what are the values of x, y, and z in CxHyOz? We can argue that modern chemical science began when scientists began exploring not only the quantitative aspects of chemistry, but also the quantitative aspects. Dalton's atomic theory, for example, was an attempt to explain the measurement results that allowed us to calculate the relative volume of elements bound to various compounds. Understanding the relationship between the mass of atoms and the chemical formula of compounds allows us to quantitatively explain the composition of matter. In the previous chapter, we explained the development of atomic mass units, the concept of average atomic mass, and the use of chemical formulas to represent the elemental composition of matter. These ideas can be expanded to calculate the formula mass of a substance by summing the average atomic mass of all atoms expressed in the formula of the material. For shared materials, the formula indicates the number and type of atoms that make up a single molecule of the material. Thus, the formula mass may be referred to accurately as molecular mass. Chlorofoam (CHCl3) was considered, it was once used as a surgical anesthetic and is currently mainly used in the production of antistick polymers, Teflon. Chlorofoam's molecular formula indicates that a single molecule contains one carbon atom, one hydrogen atom, and three chlorine atoms. Therefore, the average molecular mass of chlorofoam molecules is the same as the sum of the average atomic mass of these atoms. 1 briefly describes the calculations used to derive the molecular mass of chlorofoam, which is 119.37 amu. Figure 1. ChCl3, the average mass of chlorofoam molecules, is 119.37 muru, the sum of the average atomic masses of each component atom. The model shows the molecular structure of chlorofoam. Similarly, the molecular mass of the aspirin molecule C9H8O4 is the sum of the atomic mass of nine carbon atoms, eight hydrogen atoms and four oxygen atoms, which amounts to 180.15 amu (Figure 2). Figure 2. The average mass of aspirin molecules is 180.15 amu. This model represents the molecular structure of aspirin, C9H8O4. Computing molecular mass for shared compound ibuprofen, C13H18O2, active ingredients in framed compounds and several popular non-prescription analgesics, such as Advil and Motrin. The solution molecules in this compound consist of 13 carbon atoms, 18 hydrogen atoms, and two oxygen atoms. According to the approach described above, the average molecular mass for this compound Check your learning acetaminophen, C8H9NO2, which is an active ingredient in coactive compounds and several popular non-prescription analgesics, such as Tylenol. Ion compounds consist of isan cations and anions bound in proportions to yield electrically aeronal bulk materials. The formula mass for an ion compound is calculated in the same way as the official mass for a shared compound: by summing the average atomic mass of all atoms in the compound's formula. Keep in mind, however, that the formula for ion compounds does not represent the composition of isic acid molecules and may not be correctly called molecular mass. For example, consider the chemical name for regular table salt: sodium chloride, NaCl. Sodium chloride is an ion compound composed of sodium cations, Na+ and chloride ions, Cl−, which are combined in a 1:1 ratio. The formula mass for this compound is calculated as 58.44 amu (see Figure 3). Figure 3. Table salt, NaCl contains an array of sodium and chloride ions combined in a 1:1 ratio. Its official mass is 58.44 muru. The average mass of sodium and chlorine atoms was used in this calculation, not the mass for sodium cations and chlorine anion. This method is perfectly acceptable when calculating the formula mass of ion compounds. Sodium cations have a slightly smaller mass than sodium atoms (because electrons are missing), but this difference will be offset by the fact that chloride anion is slightly larger than chloride atoms (due to extra electrons). Moreover, the mass of electrons is negligibly small against the mass of a typical atom. Because the contribution to the entire mass is negligible even when calculating the mass of isolated ions, missing electrons or additional electrons are generally negligible and are reflected only in the insignificant numbers that will be lost when the calculated mass is properly rounded. Some exceptions to this directive are very light ions derived from elements with precisely known atomic masses. Ion compound aluminum sulfate, al2 (SO4) 3 for the acid formula mass is an ion compound used in paper manufacturing and various water purification processes. What is the formula mass (amu) of this compound? Solution The formula for this compound indicates that it contains Al3+ and SO42− ions combined in a 2:3 ratio. To calculate formula mass, we recommend that you re-create the formula in a simpler format, Al2S3O12. According to the approach described above, the formula mass for this compound is calculated as follows: check for learning calcium phosphate, Ca3 (PO4)2, ion compounds, and common anti-carkings added to food. What is the formula mass (amu) of calcium phosphate? The identity of substance It is included by the type of atom or ion, as well as the quantity of each type of atom or ion. For example, water, H2O and hydrogen peroxide, and H2O2 are similar in that each molecule consists of hydrogen and oxygen atoms. However, because hydrogen peroxide molecules contain two oxygen atoms, unlike water molecules, which have only one, the two materials have very different properties. Today, we have sophisticated instruments that allow direct measurement of these defined microscopic properties; However, the same characteristics were originally derived from the measurement of macroeconomic properties (mass and large amounts of material) using relatively simple tools (balance and volume glass products). This experimental approach required the introduction of new units for the amount of substances that remain indispensable in modern chemical sciences, the amount of moles. Moles are amount units similar to familiar units such as pairs, dozens, guns, etc. It provides specific measurements of the number of atoms or molecules in a large sample of a substance. Moles are defined as the amount of material containing the same number of isan body doors (e.g., atoms, molecules and ions) of the same number of atoms in a sample of pure 12C of 12g. One Latin celebration of the word mole is large mass or mass, which is used as the name of the device. Moles provide a link between easily measured macroeconomic properties, bulk mass and very important basic properties, atomic numbers, molecules, etc. The number of groups that make up the mole × experimentally determined to be 6.02214179 in the early 1023 year old, which is a fundamental constant called the number (NA) or abodedro constant of avogardo in honor of the Italian scientist Amedeo Avogardro. This constant is properly reported in explicit units per mole, and the convenient round version is 1023/mol × 6.022. In line with the definition as a unit, one mole for all elements contains the same number of atoms as one mole of the other element. However, since the mass of individual atoms is vastly different, the mass of 1 mole of different elements is different. The mass of the mollicini of the element (or compound) is the mass of 1 mole gram of the material, a property expressed in grams per mole (g / mol) (see Figure 4). Figure 4. Each sample contains 6.022 samples of 1.00 × -1.00 × atoms. Left to right (top row): zinc 65.4g, carbon 12.0g, magnesium 24.3g, copper 63.5g. Left to right (bottom row): 32.1g sulfur, 28.1g silicone, 207g lead, 118.7g tin. Because the definition of moles and atomic mass units is based on the same reference material, 12C, the mass of the dosing of any material is numerically identical to that atom. The weight of the radiless formula. By unsalted definition, a single 12C atom weighs 12 muru (atomic mass is 12 muru). By the definition of moles, 12 g of 12C contains 1 mole of 12C atoms (the mass of the erythring is 12 g /mol). This relationship holds for all elements because the atomic mass is measured compared to the radial reference material, 12C. Extending this principle, the dorsal mass of the compound in grams is similarly numerically identical to the official mass of the muru (Figure 5). Figure 5. Each sample contains 6.02 × 1023 molecular or formula units - 1.00 moles of compounds or elements. Clockwise from top left: C8H17OH 130.2 g (1-octanol, Formula mass 130.2 amu), 454.4 g HgI2 (II) iodine, formula mass 454.4 amu), CH3OH 32.0 g (methanol, formula mass 32.0 amu) and S8 (sulfur, formula mass 256.5 amu). (Credit: Sahar Awa) Element Average Atomic Mass (amu) Mole Mass (g/mol) Atom/Mole C 12.01 12.01 6.022 × 1023 H 1.008 1.008 6.022 × 1023 O 1 6 .00 16.00 6.022 × 1023 Na 22.99 22.99 6.022 × 1023 Cl 35.45 33.45 6.022 × 1023 votes 1. Keep in mind that the atomic mass and the dosinge mass are numerically identical, but because the sizes of each unit (amu vs. g) are vastly different in scale. To appreciate the enormity of moles, consider small drops of water weighing about 0.03 grams (see Figure 6). This represents only a small portion of water 1 mole (~18 g), but it includes more water molecules than can be clearly imagined. If molecules were distributed equally among the approximately 7 billion people on earth, each person would receive more than 100 billion molecules. Figure 6. The number of molecules in a drop of water is approximately 100 billion times larger than the number of people on earth. Moles are used in chemistry to represent 6.022 × 1023, but such a large number of conceptualizations can be difficult. Watch this video, and then complete the next thought statement. Dig deeper and review the information to learn more about moles. The relationship between the formula mass, the number of moles and avogards can be applied to calculate the various amounts that describe the composition of the substance and compounds. For example, if you know the mass and chemical composition of a substance, you can determine the number of moles and calculate the number of atoms or molecules in the sample. Similarly, if you know the number of moles in a substance, you can extract the number of atoms or molecules and calculate the mass of the substance. Deriving moles from grams for elements in accordance with the U.S. Department of Agriculture's nutrition guidelines, the estimated average requirement for dietary potassium is 4.7 g. What are the estimated average requirements? From moles? Solution K-quality is provided, and the corresponding amount of K is requested from moles. Referring to the periodic table, the atomic mass of K is 39.10 amu, so the dorsal mass is 39.10 g/mol. A given mass K (4.7g) is more than a tenth of the moly mass (39.10g), so a reasonable ballpark estimate of the number of moles is slightly larger than 0.1 moles. The amount of data in a material can be calculated by dividing the mass (g/mol) by the mass of the dole (g/mol): the factor label method cancels unit g and the answer is mol: [latex]4.7 \ru Supports this mathematical approach because it has units ofle[0.5ex]{0.5em}{{0.1ex}\hspace {-0.5}}.frac {\text{mol K}}{39.10 \rule[0.25ex]{0.5em}{0.1ex}\hspace{-0.0.5 5em}\text{g}) = 0.12 \\\text{mol K}[/latex] Calculated size (0.12 mol K) is greater than ballpark expectations. Learn to check out the light metal used to create transparent X-ray windows for Beryllium medical imaging devices. How many moles is in a thin foil window at 3.24g? The element contains 9.2 grams from the mole for the air × 10-4 mole argon of 9.2 liters. What is the mass of Ar in a liter of air? A metallurgy of solution Ar is provided and should be used to induce its mass in grams. Since the amount of Ar is less than 1 mole, the mass is about 40 g less than the mass of 1 mole in Ar. The amount of fish in question is about 1/1,000th (~10-3) of the mole, so its mass should be about 1/1,000th (~0.04g) of the dosinge mass. [Latex]9.2\time 10^{-4} \;rules[0.5ex]{1.75em}{{0.1ex}\hspace{-1.75em}\text{}};text{}\text{}};text{}};text{}}; {;\frac{39.95 \\text{g}{}{1.25em}{0.1ex}\hspace{-1.25em}\text{mol} \\text{Ar}] = 0.037\text{g Ar}[/latex] results match our expectations approximately 0.04 g Ar. 2.561 Check out the learning of gold nuggets; inducing the number of atoms in mass against utom copper is commonly used to manufacture electrical wires (Figure 7). How many copper atoms are in the copper line 5.00g? Figure 7. Copper Wire Consists of Many Reactors of Cu (Credit: Emilian Robert Vicol) The number of Cu atoms in the solution wire can be conveniently derived from the mass by a two-step calculation: first calculating the amount of fish andeys of Cu, and then using the number of Avegodadro (NA) to calculate this amount of Cu atoms Converts to numbers: Considering that the sample mass (5.00 g) provided is less than a tenth of Cu (~64g), a reasonable estimate of the number of atoms in the sample will be in the order of 100NA or about 1022 Cums. 2단계 계산 수율: [라텍스]5.00 \;\규칙[0.5ex]{0.5em}{0.1ex}\hspace{-0.5em}\텍스트{g} \;\텍스트{Cu} (\frac{\규칙[0.2]55ex]{1.25em}{{0.1ex}\hspace{-1.25em}\텍스트{mol} \;\\텍스트{Cu}{{63.55 \규칙[0.25ex]{{0.5em}{0.1ex}\h 공간 {-0.5em}\텍스트{g})(\frac{6.022 \시간 10^{23} \;\텍스트{원자}}{0.1ex}\hspace{-1.25em}\텍스트{mol}) = 4.74\시간 10^{22} \;\텍스트{구리}{/라텍스] 요인 레이블 메서드는 원하는 유닛 취소를 생성하고 계산된 결과는 예상대로 1022의 순서에 있습니다. 강에서 금을 위해 패닝하는 잠재 고객을 확인하면 15.00 g의 순금이 수집됩니다. 이 금의 수량에는 얼마나 많은 Au 원자가 있습니까? 우리 몸은 아미노산에서 단백질을 합성 하는 화합물에 대 한 그램에서 몰을 파생. 이러한 아미노산 중 하나는 분자 포뮬러 C2H5O2N을 가지고 있는 글리신입니다. 글리신 분자의 얼마나 많은 두더지가 글리신 28.35 g에 포함되어 있습니까? 솔루션 우리는 우리가 예 3에서 요소에 대해 사용하는 동일한 절차에 따라 질량에서 화합물의 두더지의 수를 파생 할 수 있습니다 : The mass of the of glycine is required for this calculation, and it is calculated in the same way as its molecular mass. Glycine mole, C2H5O2N, carbon mole 2, 5 moles of hydrogen, 2 moles of oxygen, 1 mole of nitrogen: the providing mass of glycine (~28 g) of the dorsal mass (~75 g/mol) is a little larger than a third of the calculated result (~75 g/mol), so we would expect it to be a little larger than the calculated results (3 3 3 3 3 3 3.3). [라텍스]28.35 \;\규칙[0.5ex]{0.5em}{0.1ex}\hspace{-0.5em}\텍스트{g} \텍스트{글리시인} \\;(\frac\{텍스트{글리시몰리인 e}{75.07 \;\룰[0.25ex]{0.5em}{0.1ex}\hspace{-0.5em}\텍스트{g}) = 0.378\;\\텍스트{몰리신}[/라텍스] 이 결과는 대략적인 추정치와 일치합니다. 자당, C12H22O11의 얼마나 많은 두더지가 자당 25g 샘플에 있는지 학습을 확인하십시오. 화합물 비타민 C에 대 한 몰에서 그램을 파생 분자 포뮬러 C6H8O6와 공유 화합물. 4-8세 아동을 위한 일일 권장 식이 수당은 1.42 × 10-4 mol입니다. 그램이 수당의 질량은 무엇입니까? 용액에 관해서는, 화합물의 질량은 표시된 대로 어금니양으로부터 유래될 수 있다: 이 화합물에 대한 어금량은 176.124 g/mol로 계산된다 두더지의 주어진 수는 두더지의 매우 작은 부분입니다 (~10-4 또는 1만 일); 따라서 해당 질량은 어금강 질량(~0.02 g)의 약 1만 분의 1이 될 것으로 예상됩니다. 계산을 수행, 우리는 얻을: [라텍스]1.42 \시간 10^{-4} \;\규칙[0.5ex]{1.75em}{0.1ex}\hspace{-1.75em}\텍스트{}\텍스트{비타민 C} (\frac{176.124\ 텍스트 텍스트 {g}{\규칙[0.25ex]{{0.25em}{0.1ex}\hspace{-1.25em}\텍스트{mol} \;\텍스트{비타민 C}} = 0.0250 \;\\텍스트{g 비타민 C}[/latex] 이것은 예상된 결과와 Match. What is the mass of hydrazine to make your learning 0.443 for, Inducing the number of atoms and molecules in the mass of artificial sweeteners includes 40.0 mg of sakarin (C7H5NO3S), which has a structural formula: Given that sakarin has a dole mass of 183.18 g/mol, how many sakarin molecules are at 40.0-00-00? How many carbon atoms are in the same sample? Solution The number of molecules in a given mass of compound is computed by first deriving the number of moles, as demonstrated in Example 6, and then multiplying by Avogadro's number: Using the provided mass and molar mass for saccharin yields: [latex]0.0400 \;\rule[0.5ex]{0.5em}{0.1ex}\hspace{-0.5em}\text{g} \;\text{C}_7\text{H}_5\text{NO}_3\text{S} (\frac{\rule[0.25ex]{1.25em}{0.1ex}\hspace{-1.25em}\text{mol} \;\text{C}_7\text{H}_5\text{NO}_3\text{S}}{183.18 \;\rule[0.25ex]{0.5em}{0.1ex}\hspace{-0.5em}\text{g} \;\text{C}_7\text{H}_5\text{NO}_3\text{S}) (\frac{6.022 \times 10^{23} \;\text{C}_7\text{H}_5\text{NO}_3\text{S} \;\text{molecules}}{1\;\rule[0.25ex]{1.25em}{0.1ex}\hspace{-1.25em}\text{mol} \;\text{C}_7\text{H}_5\text{NO}_3\text{S}})[/latex] [latex]= 1.31 \times 10^{20} \;\text{C}_7\text{H}_5\text{NO}_3\text{S} \;\text{molecules}[/latex] The formula for the compound shows that each molecule contains seven carbon atoms, so the number of C atoms in the sample provided is [latex]1.31 \times 10^{20} \;\text{C}_7\text{H}_5\text{NO_3\text{S molecules}\;(\\{7;text C{toms}} {1\\Text{C}_7\Text{H}_5\Text{NO}_3\Text{S Molecule}) = 9.20\Time 10^{21}\Text{C Atom}[/Latex] How many C4H10 molecules are included in 9.213 g of this compound? How many hydrogen atoms? 9.545 × 1022 molecule C4 H10; 9.545 × 1023 Atomic H the brain is the control center of the central nervous system (Figure 8). It processes stimuli detected by sensory organs to guide interactions with the outside world; it accepts complex physiological processes that result in our intellect and emotions. Includes research on anatomy and brain physiology. Significant progress has been made in brain research over the past few decades, and the BRAIN Initiative, a federal initiative announced in 2013, aims to accelerate and leverage these developments through joint efforts by various industry, academic and government agencies (www.whitehouse.gov/share/brain-initiative for more information). Figure 8. (a) The typical human brain weighs about 1.5 kg and about 1.1 L. (b) information is passed throughout the central nervous system by specialized cells called brain tissue and neurons (micrograph shows cells at 1600× Special cells, called neurons, transmit information between different parts of the central nervous system through electrical and chemical signals. Chemical signals occur at interfaces between different neurons when one of the cells diffuses across a small gap between cells (called synapses) and releases binding molecules (called neurotransmitters) on the surface of other cells. These neurotransmitter molecules are stored in a small intra-cell structure called an open resting vesicer that fuses into the cell wall and then releases their contents when neurons are stimulated accordingly. This process is called exorcitosis (see Figure 9). One neurotransmitter that has been studied very extensively is dopamine, C8H11NO2. Dopamine is involved in various neural processes that affect a variety of human behaviors. Dysfunction in the brain's dopamine system is based on serious neurological diseases such as Parkinson's disease and schizophrenia. Figure 9. (a) Chemical signals are transmitted from neurons to other cells by the release of neurotransmitter molecules at small intervals (synapses) between cells. (b) Dopamine, C8H11NO2, a neurotransmitter involved in a number of neurotransmitters. One important aspect of the complex process associated with dopamine signaling is the number of neurotransmitter molecules released during extramyctosis. It is also important to understand the mechanisms responsible for any changes in the number of neurotransmitter molecules released - for example, some dysfunction in extrostrosis, changes in the number of vesicles in neurons, or changes in the number of neurotransmitter molecules in each vesicles. Significant progress has been made recently in directly measuring the number of dopamine molecules stored in individual vesicies and the amount actually released when a vesicophage undergoes extracellularosis. Using a small probe that can selectively detect dopamine molecules in very small amounts, scientists have found that vesicopharyncies of certain types of mouse brain neurons contain an average of 30,000 dopamine molecules per vesical (about 5× 10-20 mol or 50 zmol). Analysis of these neurons from mice undergoing various medications indicates a significant change in the average number of dopamine molecules contained in individual vesicies, depending on the specific drug used, increasing or decreasing by up to three times. These research also indicates that all of the dopamine in a given vesicles is released during extracellularosis, suggesting that it may be possible to control fractions released using pharmaceutical thesis. Therapy.