

Sample Exercise 1.4 Determining Density and Using Density to Determine Volume of Mass

- (a) Calculate the density of mercury if 1.00×10^2 g occupies a volume of 7.36 cm^3 .
- (b) Calculate the volume of 65.0 g of the liquid methanol (wood alcohol) if its density is 0.791 g/mL .
- (c) What is the mass in grams of a cube of gold (density = 19.32 g/cm^3) if the length of the cube is 2.00 cm ?

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Sample Exercise 2.1 Illustrating the Size of an Atom

The diameter of a US penny is 19 mm . The diameter of a silver atom, by comparison, is only 2.88 \AA . How many silver atoms could be arranged side by side in a straight line across the diameter of a penny?

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Sample Exercise 1.5 Relating Significant Figures to the Uncertainty of a Measurement

What difference exists between the measured values 4.0 g and 4.00 g ?

Practice Exercise

A balance has a precision of $\pm 0.001 \text{ g}$. A sample that has a mass of about 25 g is placed on this balance. How many significant figures should be reported for this measurement?

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Sample Exercise 1.6 Determining the Number of Significant Figures in a Measurement

How many significant figures are in each number (assume that each number is a measured quantity)?:

- (a) 4.003
 (b) 6.023×10^{23}
 (c) 5000

How many significant figures are in each measurement?:

- (a) 3.549 g
 (b) $2.3 \times 10^4 \text{ cm}$
 (c) 0.00134 m^3

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Sample Exercise 2.4 Calculating the Atomic Weight of an Element from Isotopic Abundances**Practice Exercise**

Three isotopes of silicon occur in nature:

- ^{28}Si (92.23%), which has an atomic mass of 27.97693 amu ;
 ^{29}Si (4.68%), which has an atomic mass of 28.97649 amu ; and
 ^{30}Si (3.09%), which has an atomic mass of 29.97377 amu .

Calculate the atomic weight of silicon.

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Sample Exercise 2.5 Using the Periodic Table

Which two of the following elements would you expect to show the greatest similarity in chemical and physical properties:

B, Ca, F, He, Mg, P?

Justify your answer!

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Sample Exercise 2.6 Relating the Empirical and Molecular Formulas

Write the empirical formulas for the following molecules:

- (a) glucose, a substance also known as either blood sugar or dextrose, whose molecular formula is $\text{C}_6\text{H}_{12}\text{O}_6$;
 (b) nitrous oxide, a substance used as an anesthetic and commonly called laughing gas, whose molecular formula is N_2O .

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Sample Exercise 2.9 Identifying Ionic and Molecular Compounds

Which of the following compounds would you expect to be ionic:

N_2O , Na_2O , CaCl_2 , SF_2 ?

Practice Exercise

Which of the following compounds are molecular:

CBr_4 , FeS , P_4O_{10} , PbF_2 ?

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Sample Exercise 2.7 Writing Chemical Symbols for Ions

Give the chemical symbol, including mass number, for each of the following ions:

- (a) The ion with 22 protons, 26 neutrons, and 19 electrons;
 (b) The ion of sulfur that has 16 neutrons and 18 electrons.

Practice Exercise

How many protons, neutrons, and electrons does the $^{76}\text{Se}^{2-}$ ion possess?

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Sample Exercise 2.8 Predicting the Charges of Ions

Predict the charge expected for the most stable ion of barium and for the most stable ion of oxygen.

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Sample Exercise 2.12 Determining the Names of Ionic Compounds from Their Formulas

Name the following compounds:

- (a) K_2SO_4
- (b) $Ba(OH)_2$
- (c) $FeCl_3$

Practice Exercise

Give the chemical formula for

- (a) magnesium sulfate
- (b) silver sulfide
- (c) lead(II) nitrate

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Sample Exercise 2.15 Relating the Names and Formulas of Binary Molecular Compounds

Name the following compounds:

- (a) SO_2
- (b) PCl_5
- (c) N_2O_5

Practice Exercise

Give the chemical formula for

- (a) silicon tetrabromide,
- (b) disulfur dichloride.

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