

- d. 950 000 000 atoms of plutonium
e. 4.61×10^{17} atoms of radon
f. 8 trillion atoms of cerium
112. Calculate the number of atoms in each of the following masses.
a. 0.0082 g of gold
b. 812 g of molybdenum
c. 2.00×10^2 mg of americium
d. 10.09 kg of neon
e. 0.705 mg of bismuth
f. 37 μ g of uranium
113. Calculate the mass of each of the following.
a. 8.22×10^{23} atoms of rubidium
b. 4.05 Avogadro's constants of manganese atoms
c. 9.96×10^{26} atoms of tellurium
d. 0.000 025 Avogadro's constants of rhodium atoms
e. 88 300 000 000 000 atoms of radium
f. 2.94×10^{17} atoms of hafnium
114. Calculate the number of moles in each of the following masses.
a. 45.0 g of acetic acid, CH_3COOH
b. 7.04 g of lead(II) nitrate, $\text{Pb}(\text{NO}_3)_2$
c. 5000 kg of iron(III) oxide, Fe_2O_3
d. 12.0 mg of ethylamine, $\text{C}_2\text{H}_5\text{NH}_2$
e. 0.003 22 g of stearic acid, $\text{C}_{17}\text{H}_{35}\text{COOH}$
f. 50.0 kg of ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$
115. Calculate the mass of each of the following amounts.
a. 3.00 mol of selenium oxybromide, SeOBr_2
b. 488 mol of calcium carbonate, CaCO_3
c. 0.0091 mol of retinoic acid, $\text{C}_{20}\text{H}_{28}\text{O}_2$
d. 6.00×10^{-8} mol of nicotine, $\text{C}_{10}\text{H}_{14}\text{N}_2$
e. 2.50 mol of strontium nitrate, $\text{Sr}(\text{NO}_3)_2$
f. 3.50×10^{-6} mol of uranium hexafluoride, UF_6
116. Calculate the number of molecules or formula units in each of the following amounts.
a. 4.27 mol of tungsten(VI) oxide, WO_3
b. 0.003 00 mol of strontium nitrate, $\text{Sr}(\text{NO}_3)_2$
c. 72.5 mol of toluene, $\text{C}_6\text{H}_5\text{CH}_3$
d. 5.11×10^{-7} mol of α -tocopherol (vitamin E), $\text{C}_{29}\text{H}_{50}\text{O}_2$
e. 1500 mol of hydrazine, N_2H_4
f. 0.989 mol of nitrobenzene $\text{C}_6\text{H}_5\text{NO}_2$
117. Calculate the number of molecules or formula units in each of the following masses.
a. 285 g of iron(III) phosphate, FePO_4
b. 0.0084 g of $\text{C}_5\text{H}_5\text{N}$
c. 85 mg of 2-methyl-1-propanol, $(\text{CH}_3)_2\text{CHCH}_2\text{OH}$
d. 4.6×10^{-4} g of mercury(II) acetate, $\text{Hg}(\text{C}_2\text{H}_3\text{O}_2)_2$
e. 0.0067 g of lithium carbonate, Li_2CO_3
118. Calculate the mass of each of the following quantities.
a. 8.39×10^{23} molecules of fluorine, F_2
b. 6.82×10^{24} formula units of beryllium sulfate, BeSO_4
c. 7.004×10^{26} molecules of chloroform, CHCl_3
d. 31 billion formula units of chromium(III) formate, $\text{Cr}(\text{CHO}_2)_3$
e. 6.3×10^{18} molecules of nitric acid, HNO_3
f. 8.37×10^{25} molecules of freon 114, $\text{C}_2\text{Cl}_2\text{F}_4$
119. Precious metals are commonly measured in troy ounces. A troy ounce is equivalent to 31.1 g. How many moles are in a troy ounce of gold? How many moles are in a troy ounce of platinum? of silver?
120. A chemist needs 22.0 g of phenol, $\text{C}_6\text{H}_5\text{OH}$, for an experiment. How many moles of phenol is this?
121. A student needs 0.015 mol of iodine crystals, I_2 , for an experiment. What mass of iodine crystals should the student obtain?
122. The weight of a diamond is given in carats. One carat is equivalent to 200. mg. A pure diamond is made up entirely of carbon atoms. How many carbon atoms make up a 1.00 carat diamond?
123. 8.00 g of calcium chloride, CaCl_2 , is dissolved in 1.000 kg of water.
a. How many moles of CaCl_2 are in solution? How many moles of water are present?
b. Assume that the ionic compound, CaCl_2 , separates completely into Ca^{2+} and Cl^- ions when it dissolves in water. How many moles of each ion are present in the solution?
124. How many moles are in each of the following masses?
a. 453.6 g (1.000 pound) of sucrose (table sugar), $\text{C}_{12}\text{H}_{22}\text{O}_{11}$
b. 1.000 pound of table salt, NaCl
125. When the ionic compound NH_4Cl dissolves in water, it breaks into one ammonium ion, NH_4^+ , and one chloride ion, Cl^- . If you dissolved 10.7 g of NH_4Cl in water, how many moles of ions would be in solution?
126. What is the total amount in moles of atoms in a jar that contains 2.41×10^{24} atoms of chromium, 1.51×10^{23} atoms of nickel, and 3.01×10^{23} atoms of copper?
127. The density of liquid water is 0.997 g/mL at 25°C.
a. Calculate the mass of 250.0 mL (about a cupful) of water.
b. How many moles of water are in 250.0 mL of water? Hint: Use the result of (a).
c. Calculate the volume that would be occupied by 2.000 mol of water at 25°C.
d. What mass of water is 2.000 mol of water?
128. An Avogadro's constant (1 mol) of sugar molecules has a mass of 342 g, but an Avogadro's constant (1 mol) of water molecules has a mass of only 18 g. Explain why there is such a difference between the mass of 1 mol of sugar and the mass of 1 mol of water.
129. Calculate the mass of aluminum that would have the same number of atoms as 6.35 g of cadmium.
130. A chemist weighs a steel cylinder of compressed oxygen, O_2 , and finds that it has a mass of 1027.8 g. After some of the oxygen is used in an experiment, the cylinder has a mass of 1023.2 g. How many moles of oxygen gas are used in the experiment?
131. Suppose that you could decompose 0.250 mol of Ag_2S into its elements.
a. How many moles of silver would you have? How many moles of sulfur would you have?
b. How many moles of Ag_2S are there in 38.8 g of Ag_2S ? How many moles of silver and sulfur would be produced from this amount of Ag_2S ?
c. Calculate the masses of silver and sulfur produced in (b).