

FUN WITH MOLES

1. Zinc is used as a corrosion-resistant coating on iron and steel. It is also an essential trace element in your diet. Calculate the number of moles in 4.50×10^{24} atoms of zinc.
2. Chromium is a transition element used as a coating on metals and in steel alloys to control corrosion. Calculate the mass (in grams) of 0.0450 moles of Chromium.
3. Gold is one of a group of metals called the coinage metals (copper, silver, & gold). How many atoms of gold are in a pure gold nugget having a mass of 25.0g?
4. Calcium, the fifth most abundant element on earth, is always found combined with other elements because of its high reactivity. How many moles of calcium are in 525 g of calcium.
5. A party balloon contains 5.50×10^{22} atoms of helium gas. What is the mass in grams of Helium.
6. Aluminum is a metal with a high strength-to-mass ratio and a high resistance to corrosion; thus it is often used for structural purposes. Calculate the number of moles in a 10.0g sample of Aluminum, and then calculate how many atoms this 10.0 g sample of aluminum contains.
7. A silicon chip is used in an integrated circuit of a microcomputer has a mass of 5.68 mg. How many silicon atoms are present in the chip? (remember moles are only calculated in grams)
8. Cobalt is a metal that is added to steel to improve its resistance to corrosion. Calculate the number of moles in a 5.00×10^{20} atoms of cobalt, and then calculate the mass of the sample.
9. Juglone, a dye known for centuries, is produced from the husks of black walnuts. It is also a natural herbicide (weed killer) that kills off competitive plants around the black walnut tree but does not affect grass and other noncompetitive plants. The formula for juglone is: $C_{10}H_6O_3$
 - a.) Calculate the molar mass of juglone.
 - b.) A sample of 1.56×10^{-2} g of pure juglone was extracted from black walnut husks. How many moles of juglone does this sample represent?
10. Calculate the mass of a sample of aluminum that contains 75 atoms of aluminum.
11. Calculate the number of sodium atoms present in a sample that has a mass of 1172.49 g.

12. Polyvinyl chloride (PVC), which is widely used for floor coverings (“vinyl”) and for plastic pipes in plumbing systems, is made from a molecule with the formula C_2H_3Cl . Calculate the molar mass.
13. The substance Teflon, the slippery coating on many frying pans, is made from the C_2F_4 molecule. Calculate the number of molecules of C_2F_4 in a 135 g sample of Teflon.
14. If an average atom of sulfur has a mass of 32.07 g, how many sulfur atoms are contained in a sample with a mass of 8274 g?
15. What mass of iron contains the same number of atoms as 14.01 g of nitrogen?
16. Which has a greater mass, 0.50 mol of oxygen atoms or 4 mol of hydrogen atoms?
17. Calculate the number of grams of iron that contain the same number of atoms as 2.24 g of cobalt.
18. If a snowflake contains 1.9×10^{18} molecules of water, how many moles of water does it contain?
19. Benzoyl peroxide, ($C_{14}H_{10}O_4$) a substance used as an acne medicine. What is the mass in grams of 3.50×10^{-2} moles of benzoyl peroxide.
20. Hydrofluoric acid is used to etch glass. Determine the mass of 4.95×10^{25} mL of the acid.
21. The density of lead is 11.3 g/cm^3 . Calculate the volume of one mole of lead.
22. Acetaminophen, a common aspirin substitute, has the formula $C_8H_9NO_2$. Determine the number of molecules of acetaminophen in a 500 mg tablet. (remember to calculate in grams)
23. A party balloon was filled with 9.80×10^{22} atoms of Helium. After 24 hours, 45% of the helium had escaped. How many atoms of helium remain?
24. How many molecules of isooctane (C_8H_{18}) are present in 1.00 L? Density of isooctane is 0.680 g/mL.
25. Diamond is a naturally occurring form of carbon. If you have a 0.25 carat diamond, how many carbon atoms are present? (1 carat = 200 mg)

