

Review #4: Calculations using Moles, Simplest Formulas and Molecular Formulas

1. How many atoms are there in one molecule of acetic acid?
2. How many atoms are there in one molecule of $\text{Cr}(\text{NO}_3)_3$?
3. How many things are there in one mole?
4. What is the mass of one molecule of water in a.m.u.?
5. What is the molar mass of water?
6. You are given 30.0 grams of water. How many:
 - a) moles of water is this?
 - b) molecules of water is this?
 - c) atoms is this (in total)?
 - d) atoms of hydrogen is this?
 - e) grams of oxygen is this?
7. What volume is occupied by 10.0 grams of water vapour at STP?
8. What is the mass of 100.0 L of methane gas (CH_4) at STP?
9. How many molecules of water are there in 5.00 L of water vapour at STP?
10. What is the molar mass of $\text{Sn}_3(\text{PO}_4)_2$?
11. How many moles are there in 195 g of CO_2 ?
12. How many molecules are there in 195 g of CO_2 ?
13. If you have 4.80×10^{24} molecules of CO_2 :
 - a) how many moles is this?
 - b) what is the mass?
 - c) what volume will this gas occupy at STP?
14. What is the mass of 89.6 L of carbon dioxide at STP?
15. You have 8.50 g of carbon dioxide.
 - a) How many moles of CO_2 is this?
 - b) How many molecules of CO_2 is this?
 - c) How many atoms of oxygen are in this amount of CO_2 ?
 - d) What is the mass of carbon in this amount of CO_2 ?
 - e) What volume will this amount of CO_2 occupy at STP?
16. How many moles are there in:
 - a) 1.5 g of NaCl
 - b) 4.5 L of CH_4 gas at STP
 - c) 5.0×10^{25} molecules of NO
 - d) 1.50×10^6 atoms of neon, Ne
 - e) 2.00 L of a solution of 6.00 M HCl
 - f) 1.22 L of propane gas at STP
 - g) 300.0 mL of a 2.00 M NaOH solution

17. Find the percentage by mass of nitrogen in $\text{Al}(\text{NO}_3)_3$.
18. Calculate the mass of 0.0250 mol of NaF.
19. Calculate the mass of 1.50 L of argon gas, Ar, at STP.
20. A sample of a chemical was analyzed and found to contain 138 grams of sodium, 36 grams of carbon and 144 grams of oxygen. Determine the simplest formula for the compound.
21. A chemist analyzes a sample of rock from the centre of the earth. It contains 18.61 g of iron and 8.00 g of oxygen. What is the simplest formula for the iron compound in the rock?
22. Analysis of an organic compound shows that it contains 61.02% carbon, 11.86% hydrogen and 27.12% oxygen. What is the simplest formula of the compound? If the molar mass of the compound is 118.1 g/mol, what is the molecular formula of the compound?
23. Find the simplest formula for the compound with composition:
 - a) 38.7% carbon, 9.7% hydrogen and 51.6% oxygen
 - b) 82.4% nitrogen and 17.6% hydrogen
24. A certain compound is 40.0% carbon, 6.7% hydrogen and 53.3% oxygen by weight. One mole of this substance weighs 180 grams. What is the molecular formula of the compound?