

- Which compound has the empirical formula CH?
A) CH₄ B) C₂H₄ C) C₆H₆ D) C₃H₈
- What is the empirical formula of the compound whose molecular formula is P₄O₁₀?
A) PO B) PO₂ C) P₂O₅ D) P₈O₂₀
- What is the total number of moles of atoms contained in 1 mole of NH₃?
A) 1 mole B) 2 moles
C) 3 moles D) 4 moles
- The molecular formula of a compound is represented by X₃Y₆. What is the empirical formula of this compound?
A) X₃Y B) X₂Y C) XY₂ D) XY₃
- What is the empirical formula of a compound that has a carbon-to-hydrogen ratio of 2 to 6?
A) CH₃ B) C₂H₆ C) C₃H D) C₆H₂
- The empirical formula of a compound is CH₂. The molecular formula of this compound could be
A) CH₄ B) C₂H₂ C) C₂H₄ D) C₂H₆
- A compound whose empirical formula is NO₂ could have a molecular mass of
A) 23 B) 39 C) 92 D) 120
- Which chemical formula is both an empirical formula and a molecular formula?
A) CH₄ B) C₂H₆
C) CH₃COOH D) CH₃CH₂COOCH₃
- What is the gram formula mass of K₂CO₃?
A) 138 g B) 106 g C) 99 g D) 67 g
- What is the gram formula mass of Mg(ClO₃)₂?
A) 107 g B) 142 g
C) 174 g D) 191 g
- How many moles of water are contained in 0.250 mole of CuSO₄ • 5H₂O?
A) 1.25 B) 4.50 C) 40.0 D) 62.5
- What is the total number of oxygen atoms in the formula MgSO₄ • 7 H₂O? [The • represents seven units of H₂O attached to one unit of MgSO₄ .]
A) 11 B) 7 C) 5 D) 4
- Which represents the greatest mass of chlorine?
A) 1 mole of chlorine
B) 1 atom of chlorine
C) 1 gram of chlorine
D) 1 molecule of chlorine
- One mole of O₂ has approximately the same mass as one mole of
A) CH₄ B) S C) LiH D) Cl₂
- What is the mass in grams of 2.0 moles of NO₂?
A) 92 B) 60. C) 46 D) 30.
- The total number of moles represented by 20 grams of CaCO₃ is
A) 1 B) 2 C) 0.1 D) 0.2
- What is the gram-molecular mass of a compound if 5 moles of the compound has a mass of 100 grams?
A) 5 g B) 20 g
C) 100 g D) 500 g
- What is the mass in grams of 1.00 mole of O₂ gas?
A) 11.2 B) 16.0 C) 22.4 D) 32.0
- What is the total mass of oxygen in 1.00 mole of Al₂(CrO₄)₃?
A) 192 g B) 112 g
C) 64.0 g D) 48.0 g
- What is the molecular formula of a compound with the empirical formula P₂O₅ and a gram-molecular mass of 284 grams?
A) P₂O₅ B) P₅O₂
C) P₁₀O₄ D) P₄O₁₀
- If the empirical formula for an organic compound is CH₂O, then the molecular mass of the compound could be
A) 135 B) 60 C) 45 D) 15

Moles

22. Which of the following gases has the greatest density at STP?
A) SO₂ B) CO₂ C) Cl₂ D) N₂
23. What is the gram molecular mass of a gas that has a density of 5.00 grams per liter at STP?
A) 27.4 g B) 56.0 g
C) 112 g D) 223 g
24. A compound consists of 25.9% nitrogen and 74.1% oxygen by mass. What is the empirical formula of the compound?
A) NO B) NO₂ C) N₂O D) N₂O₅
25. A compound contains 57% sulfur and 43% oxygen by mass. What is the empirical formula of this compound?
A) SO B) SO₂ C) SO₃ D) S₂O₃
26. A hydrated salt is a solid that includes water molecules within its crystal structure. A student heated a 9.10-gram sample of a hydrated salt to a constant mass of 5.41 grams. What percent by mass of water did the salt contain?
A) 3.69% B) 16.8%
C) 40.5% D) 59.5%
27. Which compound has the greatest percent composition by mass of sulfur?
A) BaS B) CaS C) MgS D) SrS
28. The percentage by mass of hydrogen in H₃PO₄ is equal to
A) $\frac{1 \times 100}{98}$ B) $\frac{3 \times 100}{98}$
C) $\frac{98 \times 100}{3}$ D) $\frac{98 \times 100}{1}$
29. What is the percent composition by mass of aluminum in Al₂(SO₄)₃ (gram-formula mass = 342 grams/mole)?
A) 7.89% B) 15.8%
C) 20.8% D) 36.0%
30. A student determining the percent by mass of water in a hydrated crystal obtained the following data.
Mass of crystal before heating.....5.0 g
Mass of crystal after 1st heating.....4.0 g
Mass of crystal after 2nd heating.....4.0 g
What is the percent by mass of water in the hydrate?
A) 0.80% B) 0.20%
C) 80.% D) 20.%
31. What is the total number of neon atoms contained in 20.2 grams of neon gas?
A) 1.01×10^{24} B) 2.02×10^{24}
C) 3.01×10^{23} D) 6.02×10^{23}
32. What is the total number of atoms contained in 80. grams of neon?
A) 6.0×10^{23} B) 1.2×10^{24}
C) 2.4×10^{24} D) 4.8×10^{24}
33. What is the total number of atoms in 1.0 mole of CO₂?
A) 1.5×10^{23} B) 12×10^{23}
C) 3.0×10^{23} D) 18×10^{23}
34. What is the total number of nitrogen atoms in 0.25 mole of NO₂ gas?
A) 1.5×10^{23} B) 6.0×10^{23}
C) 3.0×10^{23} D) 1.2×10^{24}
35. Which sample contains a total of 6.0×10^{23} atoms?
A) 23 g Na B) 24 g C
C) 42 g Kr D) 78 g K
36. What is the volume of 1.50 moles of an ideal gas at STP?
A) 11.2 L B) 22.4 L
C) 33.6 L D) 44.8 L
37. At standard temperature, 1.0 liter of O₂(g) at 760 torr contains the same number of molecules as
A) 2.0 L of O₂(g) at 380 torr
B) 2.0 L of O₂(g) at 760 torr
C) 0.50 L of O₂(g) at 380 torr
D) 0.50 L of O₂(g) at 760 torr

Moles

38. At STP, what is the total volume occupied by a 2.00-gram sample of $\text{H}_2(\text{g})$?

A) 1.00 L

B) 2.00 L

C) 11.2 L

D) 22.4 L

39. At STP, which sample contains the same number of molecules as 11.2 liters of $\text{CO}_2(\text{g})$ at STP?

A) 5.6L of $\text{NO}_2(\text{g})$

B) 7.5 L of $\text{H}_2(\text{g})$

C) 11.2 L of $\text{N}_2(\text{g})$

D) 22.4 L of $\text{CO}(\text{g})$
