

1. How many moles of calcium (Ca) are in 77.4 g of it?
- A) 3.86 B) 0.52 C) 1.93 D) 0.97

-
2. The urea $\text{CO}(\text{NH}_2)_2$ is used as a fertilizer. How many hydrogen atoms are present in 25.6 g of it?
- A) 1.54×10^{25} B) 1.03×10^{24} C) 2.41×10^{23} D) 1.20×10^{23}

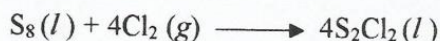
-
3. Tin(II) fluoride (SnF_2) is often added to toothpaste as an ingredient to prevent tooth decay. What is the mass of "F" in grams in 24.6 g of the compound?
- A) 6.37 B) 1.54 C) 4.12 D) 5.97

-
4. The aluminum sulfate hydrate $[\text{Al}_2(\text{SO}_4)_3 \cdot x\text{H}_2\text{O}]$ contains 8.10 percent "Al" by mass. What is the value of x ?
- A) 2 B) 5 C) 18 D) 10
- $\% \text{Al} = 0.081 = \frac{2 * 26.98}{342.17 + x(18)}$ $x = 18$

-
5. The empirical formulas of a compound with the following composition: 40.1 % C, 6.6 % H and 53.3 % O is:
- A) CH_2O B) $\text{C}_{10}\text{H}_{20}\text{O}_{10}$ C) $\text{C}_3\text{H}_7\text{O}_3$ D) $\text{C}_5\text{H}_{10}\text{O}_5$

-
6. Hydrogen fluoride HF is prepared by the reaction:
- $$\text{CaF}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{CaSO}_4 + 2\text{HF}$$
- In one process, 6.00 kg of CaF_2 are treated with an excess of H_2SO_4 and 2.86 kg of HF are produced. What is the percent yield of HF?
- A) 82% B) 96% C) 93% D) 87%

7. What is the theoretical yield of disulfide chloride S_2Cl_2 in grams when 4.06 g of S_8 are heated with 6.24 g of Cl_2 according to:



- A) 6.85 B) 7.45 C) 8.56 D) 9.37

8. Pure acetic acid, CH_3COOH , known as glacial acetic acid, is liquid with density of 1.049 g/mL at 25 °C. What is the molarity of a solution of acetic acid made by dissolving 20.00 mL of glacial acetic acid at 25 °C in enough water to make 250.0 mL of solution?

- A) 1.40 B) 0.08 C) 1.33 D) 1.20

$$1.049 \frac{g}{mL} \times 20 mL = 20.98 g \quad Mwt = 60 \frac{g}{mol} \quad mol = 0.35 mol$$

$$0.35 / 0.25 = 1.4 M$$

9. Commercial aqueous solution of nitric acid, HNO_3 , has a density of 1.42 g/mL and a molarity of 16 M. What is the mass percentage of nitric acid in the solution?

- A) 91 B) 71 C) 63 D) 85

$$\% = \frac{\text{mass } HNO_3}{\text{mass soln}} = \frac{16 \times 63}{1420} = \frac{1008}{1420} \times 100\% = 71\%$$

$$1.42 \frac{g}{mL} \text{ solution} = 1420 \frac{g}{L}$$

$$M = 16 \frac{mol}{L \text{ soln}} \quad Mwt = 63 \frac{g}{mol}$$

10. Under constant-pressure conditions, a sample of hydrogen gas initially at 88 °C and 9.6 L is cooled until its final volume is 3.4 L. What is its final temperature?

- A) 106.2 K B) 304.2 K C) 299.2 K D) 127.9 K

11. If 6.9 moles of carbon monoxide gas " CO ", are present in a container of volume 30.4 L. What is the pressure of the gas (in atm) if the temperature is 62 °C?

- A) 1.2 B) 9.6 C) 6.2 D) 5.4

12. What is the approximate volume (in liters) of 88.4 g of CO_2 at STP?

- A) 38 B) 49 C) 45 D) 42
-

13. A mixture containing 0.765 mol He (g), 0.330 mol Ne (g), and 0.110 mol Ar (g) is confined in a 10.00 L vessel at 25 °C. What is the partial pressure (in atm) of Ne gas?

- A) 0.27 B) 1.87 C) 1.11 D) 0.81
-

14. What is the density of hydrogen bromide (HBr) gas in grams per liter, at 733 mmHg and 46 °C?

- A) 3.67 B) 2.35 C) 2.98 D) 3.24
-

15. Nickel forms a gaseous compound of the formula $\text{Ni}(\text{CO})_x$. What is the value of x , given the fact that under the same conditions of temperature and pressure, methane (CH_4) effuses 3.3 times faster than the compound?

- A) 5 B) 2 C) 3 D) 4