

1. First write the chemical formula, then determine the % composition of each element in each the following compounds.
  - a. potassium sulfite
  - b. barium hydroxide
  - c. gallium chromate
2. Calculate the theoretical mass % composition of water (That is to say....determine the mass % of each element).
3. Perform a theoretical elemental analysis of aluminum nitrate. (That is to say..... calculate the mass % composition of each element.)
4. If you experimentally analyzed magnesium oxide and found that it was made of 0.180 g of magnesium and 0.119 g of oxygen, calculate the % (by mass) of each compound.
5. What mass of aluminum would you be able to extract from 1.65 g of aluminum oxide?
6. What is the mass of barium in 26.0 g of barium hydroxide?

## Answers

1. a.  $\text{K}_2\text{SO}_3$  MM = **158.27 g/mole** [  $2(39.1) + 32.07 + 3(16)$  ]
  - K = 49.4 % [  $(78.2/158.27) \times 100$  ]
  - S = 20.3 % [  $(32.07/158.27) \times 100$  ]
  - O = 30.3 % [  $(48/158.27) \times 100$  ]
  
- b.  $\text{Ba}(\text{OH})_2$  MM = **171.34 g/mole** [  $137.32 + 2(16) + 2(1.01)$  ]
  - Ba = 80.1 % [  $(137.32/171.34) \times 100$  ]
  - O = 18.7 % [  $(32/171.34) \times 100$  ]
  - H = 1.2 % [  $(2.02/171.34) \times 100$  ]
  
- c.  $\text{Ga}_2(\text{CrO}_4)_3$  MM = **487.44 g/mole** [  $2(69.72) + 3(52) + 12(16)$  ]
  - Ga = 28.6 % [  $(139.44/487.44) \times 100$  ]
  - Cr = 32.0% [  $(156/487.44) \times 100$  ]
  - O = 39.4 % [  $(192/487.44) \times 100$  ]
  
2. **11.1% hydrogen and 88.8% oxygen**  $\frac{2.02}{18.02} \times 100 = 11.1\%$  and  $100\% - 11.1\%$
  
3.  $\text{Al}(\text{NO}_3)_3$  **12.7% aluminum, 19.7% nitrogen, and 67.6% oxygen** MM = [  $26.98 + 3(14.01) + 9(16) = 213.01$  ]
 
$$\frac{26.98}{213.01} \times 100 = 12.7\% \quad \frac{42.02}{213.01} \times 100 = 19.7\% \quad \frac{144}{213.01} \times 100 = 67.6\%$$
  
4. **60.2% magnesium and 39.8% oxygen**  $\frac{0.180\text{g}}{0.299\text{g}} \times 100 = 60.2\%$  and  $100\% - 60.2\% = 39.8\%$
  
5.  $\text{Al}_2\text{O}_3$   $\frac{2(27)}{2(27) + 3(16)} \times 1.65\text{g} = 0.874\text{g of Al}$
  
6. From problem (1b), we know that barium hydroxide is 80.1 % barium, thus  $0.801 \times 26.0\text{g} = \mathbf{20.8\text{ g of barium.}}$