Answer on the question #65594, Chemistry / Other

Question:

1.)How much iron is present in 8 . 13 g of iron(III) oxide? Answer in units of g.

2.) A chemist wants to extract the gold from 62 . 21 g of AuCl 3 · 2 H 2 O (gold(III) chloride dihydrate) by electrolysis of an aqueous solution. What mass of gold could be obtained from this sample? Answer in units of g.

3 (part 1 of 2) 10.0 points The molecular weight of erbium is 167 . 259 g/mol, sulfur is 32 . 065 g/mol, oxygen is 15 . 9994 g/mol, hydrogen is 1 . 00794 g/mol, carbon is 12 . 0107 g/mol, tin is 118 . 71 g/mol, and strontium is 87 . 62 g/mol. What is the percentage of C in glycerol? Answer in units of %.

4 (part 2 of 2) 10.0 points What is the percentage of H in glycerol? Answer in units of %.

5). 10.0 points What is the % carbon, by weight, in a 0 . 166 g sample of C 2 H 6 ? Answer in units of %.

Solution:

1) Iron (III) oxide formula is Fe_2O_3. Then, molar mass of Fe_2O_3 is 159.69 g/mol. The number of the moles if Fe_2O_3 is:

$$n(Fe_2O_3) = \frac{m}{M} = \frac{62.21\ (g)}{159.69\ (g\ mol^{-1})} = 0.3896\ mol$$

The molar mass of iron is 55.845 g/mol. The number of the moles of iron and iron(III) oxide relate as:

$$n(Fe_2O_3) = \frac{n(Fe)}{2}$$

Then, the mass of iron is:

$$m(Fe) = n \cdot M = 0.3896(g) \cdot 2 \cdot 55.845\ (g\ mol^{-1}) = 43.51g$$

2) As it can be seen from formula, the number of the moles of gold (molar mass of 196.966569 g/mol) and gold chloride dihydrate (molar mass of 339.3561 g/mol) are equal. So, the mass of gold in the compound is:

$$m(Au) = n \cdot M = \frac{62.21(g)}{339.3561(g\ mol^{-1})} \cdot 196.966569(g\ mol^{-1}) = 36.10\ (g)$$

3) The formula of glycerol is $C_3H_8O_3$, and the molar mass is 92.0938 g/mol. Also, we know that the molar mass of carbon is 12.0107 g/mol, and there are 3 atoms of carbon in one molecule of glycerol. Then, the mass percentage of carbon in glycerol is:

$$\omega(C) = \frac{m(C)}{m(C_3H_8O_3)} \cdot 100\% = \frac{3M(C)}{M(C_3H_8O_3)} \cdot 100\% = \frac{3 \cdot 12.0107(g\ mol^{-1})}{92.0938(g\ mol^{-1})} \cdot 100\%$$

$$\omega(C) = 39.1\%$$

4) The percentage of hydrogen in glycerol:

$$\omega(H) = \frac{m(H)}{m(C_3H_8O_3)} \cdot 100\% = \frac{8M(H)}{M(C_3H_8O_3)} \cdot 100\% = \frac{8 \cdot 1.00794(g\ mol^{-1})}{92.0938(g\ m\square l^{-1})} \cdot 100\%$$

$$\omega(H) = 8.76\ \%$$

5) The mass percentage of carbon in C_2H_6 is:

$$\omega(C) = \frac{m(C)}{m(C_2H_6)} \cdot 100\% = \frac{2M(C)}{M(C_2H_6)} \cdot 100\% = \frac{2 \cdot 12.0107(g\ mol^{-1})}{30.0690(g\ mol^{-1})} \cdot 100\%$$

$$\omega(C) = 79.9\%$$

Answer: 1) 43.51g 2) 36.10g 3) 39.1% 4) 8.76% 5) 79.9%