Answer on Question#39839 - Chemistry - Other

Questions

1) If 56.0 mL of $BaCl_2$ solution is needed to precipitate all the sulfate ion in a 740 mg sample of Na_2SO_4, what is the molarity of the solution?

2) If 43.0 mL of 0.210 M HCl solution is needed to neutralize a solution of $Ca(OH)_2$, how many grams of $Ca(OH)_2$ must be in the solution?

Answer

1) The total chemical reaction of this process:

$Na_2SO_4 + BaCl_2 = 2NaCl + BaSO_4$

The molarity of a solution could be calculated

according to the formula:

$$C_M=\frac{\nu}{V}$$

where ν- moles of the solute, moles;

V-volume of the solvent, l.

$$\nu=\frac{m}{M}$$

where m-mass of the solute, grams;

M-molar mass of the solute, gram/moles.

$M(Na_2SO_4)=142 g/mol$

$$\nu(Na_2SO_4)=\frac{0.74}{142}=0.0052 mol$$

$$\nu(Na_2SO_4)=\nu(BaCl_2)=0.0052 mol$$

$$C_M(BaCl_2)=\frac{0.0052}{0.056}=0.093 M$$

2) The total chemical reaction of this process:

$2HCl + Ca(OH)_2 = CaCl_2 + 2H_2O$

The molarity of a solution could be calculated

according to the formula:

$$C_M = \frac{v}{V}$$

where v- moles of the solute, moles;

V-volume of the solvent, l.

According to this equation, the amount of moles is:

$$v = C_M \cdot V$$

$$v(HCl) = 0.210 \cdot 0.043 = 0.0090 \text{ mol}$$

$$v(Ca(OH)_2) = \frac{v(HCl)}{2} = \frac{0.0090}{2} = 0.0045 \text{ mol}$$

$$v = \frac{m}{M} \qquad m = v \cdot M$$

where m-mass of the solute, grams;

M-molar mass of the solute, gram/moles.

$$M(Ca(OH)_2) = 74 \text{ g/mol}$$

$$m(Ca(OH)_2) = 0.00452 \cdot 74 = 0.33 \text{ g}$$