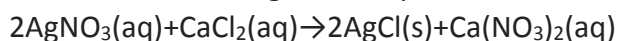


## Answer on Question#55503 – Chemistry – General Chemistry

### Question:

When solutions of silver nitrate and calcium chloride are mixed, silver chloride precipitates out of solution according to the equation



#### Part A

What mass of silver chloride can be produced from 1.14 L of a 0.285 M solution of silver nitrate? Express your answer with the appropriate units.

#### Part B

The reaction described in Part A required 4.00 L of calcium chloride. What is the concentration of this calcium chloride solution? Express your answer with the appropriate units.

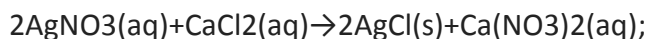
#### Part A

##### Solution:

$$V(\text{solution of AgNO}_3) = 1.14 \text{ L};$$

$$C(\text{AgNO}_3) = 0.285 \text{ M};$$

$$m(\text{AgCl}) - ?$$



According to the equation:  $n(\text{AgNO}_3) : n(\text{AgCl}) = 1:1$ ;

$$C = \frac{n}{V}; n = CV;$$

C – the molar concentration (M);

n – the amount of substance (mol);

V – the volume of the solution (L);

$$n(\text{AgNO}_3) = C(\text{AgNO}_3) \times V;$$

$$n(\text{AgNO}_3) = n(\text{AgCl}) = 0.3249 \text{ mol};$$

$$n = \frac{m}{M}; m = nM;$$

m – the mass (g);

M – the molar mass ( $\text{g} \times \text{mol}^{-1}$ );

$$M(\text{AgCl}) = 143.5 \text{ g} \times \text{mol}^{-1};$$

$$m(\text{AgCl}) = M(\text{AgCl}) \times n(\text{AgCl});$$

$$m(\text{AgCl}) = \underline{46.62 \text{ g}};$$

**Answer:** 46.62 g

### Part B

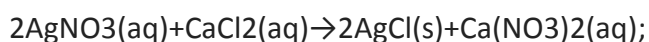
#### **Solution:**

$$V(\text{solution of AgNO}_3) = 1.14 \text{ L};$$

$$C(\text{AgNO}_3) = 0.285 \text{ M};$$

$$V(\text{solution of CaCl}_2) = 4.00 \text{ L};$$

What is the concentration of this calcium chloride solution?



According to the equation:  $n(\text{AgNO}_3) : n(\text{CaCl}_2) = 2:1$ ;

$$n(\text{CaCl}_2) = 0.16245 \text{ mol};$$

$$C(\text{CaCl}_2) = \frac{n(\text{CaCl}_2)}{V};$$

$$C(\text{CaCl}_2) = \underline{0.04 \text{ M}};$$

**Answer:** 0.04 M

#### Notice:

The question is what the concentration of the calcium chloride solution is. In case, that one wants to discover the mass concentration of the solution, not the molar concentration, we have to suppose that the density of the solution = 1;  $D = \frac{m(\text{the solution})}{V}$ ;  $m(\text{of the solution}) = DV$ ;

$$m(\text{the solution of CaCl}_2) = 4 \times 10^3 \text{ g};$$

$$n(\text{CaCl}_2) = 0.16245 \text{ mol};$$

$$M(\text{CaCl}_2) = 111 \text{ g} \times \text{mol}^{-1};$$

$$m(\text{CaCl}_2) = 18.03 \text{ g};$$

$$m(\text{the solution of CaCl}_2) = 4 \times 10^3 \text{ g};$$

$$W = \frac{m(\text{the solute})}{m(\text{the solution})} 100\%;$$

$$W(\text{CaCl}_2) = 0.45\%$$