Question 1 – A 12.42 g sample of a mixture of $NaCl_{(s)}$ and $CaCl_{2(s)}$ was dissolved in water. Excess $AgNO_3$ was added, and all of the chloride was precipitated as AgCl. 31.70 g of AgCl was collected. Calculate the %w/w of NaCl in the original mixture.

$$m_{NaCl} + m_{CaCl_2} = 12.42\ g \quad (\mathbf{1})$$

$$Moles\ of\ Cl^-\ from\ NaCl + CaCl_2 = moles\ of\ Cl^-\ in\ AgCl$$

$$n_{NaCl} + 2n_{CaCl_2} = n_{AgCl}$$

$$n_{AgCl} = \frac{m_{AgCl}}{MW_{AgCl}} = \frac{31.70\ g}{143.3\ g/mol} = 0.2212\ mol$$

(I will give you any atomic masses you need on the real test)

$$n_{NaCl} + 2n_{CaCl_2} = 0.2212\ mol \quad (\mathbf{2})$$

METHOD #1

$$m_{NaCl} = n_{NaCl} \times MW_{NaCl}, and\ m_{CaCl_2} = n_{CaCl_2} \times MW_{CaCl_2}$$

Substitute the above into (**1**)