

Titration

- Lösung -

- $n(\text{NaOH}) = m / M = 5 \text{ g} / 40 \text{ g/mol} = 0,125 \text{ mol}$
 $c = n / V = 0,125 \text{ mol} / 0,5 \text{ l} = \mathbf{0,25 \text{ mol/l}}$
- $n(\text{KNO}_3) = m / M = 1 \text{ g} / 101,1 \text{ g/mol} = 0,01 \text{ mol}$
 $c = n / V = 0,01 \text{ mol} / 0,5 \text{ l} = \mathbf{0,02 \text{ mol/l}}$
- a) $n(\text{HCl}) = c \times V = 0,1 \text{ mol/l} \times 0,025 \text{ l} = \mathbf{0,0025 \text{ mol}} = n(\text{H}^+)$

b) $\text{HCl} + \text{NaOH} \rightarrow \text{H}_2\text{O} + \text{NaCl}$
 $n(\text{NaOH}) / n(\text{HCl}) = 1 / 1 \rightarrow n(\text{NaOH}) = n(\text{HCl}) = 0,0025 \text{ mol}$
 $V(\text{NaOH}) = n / c = 0,0025 \text{ mol} / 0,125 \text{ mol/l} = 0,02 \text{ l} = \mathbf{20 \text{ ml}}$
- $n(\text{NaOH}) = n(\text{HCl})$
 $n(\text{NaOH}) = c \times V = 0,1 \text{ mol/l} \times 0,0158 \text{ l} = 0,00158 \text{ mol} = n(\text{HCl})$
 $c(\text{HCl}) = n / V = 0,00158 \text{ mol} / 0,02 \text{ l} = \mathbf{0,079 \text{ mol/l}}$
- $\text{Ca}(\text{OH})_2 + 2 \text{HCl} \rightarrow \text{CaCl}_2 + 2 \text{H}_2\text{O}$
 $n(\text{Ca}(\text{OH})_2) / n(\text{HCl}) = 1 / 2 \rightarrow n(\text{Ca}(\text{OH})_2) = 1/2 \times n(\text{HCl})$
 $n(\text{HCl}) = c \times V = 0,1 \text{ mol/l} \times 0,004 \text{ l} = 0,0004 \text{ mol}$
 $n(\text{Ca}(\text{OH})_2) = 0,0002 \text{ mol}$
 $c(\text{Ca}(\text{OH})_2) = n / V = 0,0002 \text{ mol} / 0,1 \text{ l} = \mathbf{0,002 \text{ mol/l}}$
 $n(\text{Ca}(\text{OH})_2) = m / M \rightarrow m = n \times M = 0,0002 \text{ mol} \times 74 \text{ g/mol} = \mathbf{0,0148 \text{ g}}$
- $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
 $n(\text{NaOH}) / n(\text{HCl}) = 1 / 1 \rightarrow n(\text{NaOH}) = n(\text{HCl})$
 $n(\text{HCl}) = c \times V = 0,1 \text{ mol/l} \times 0,0165 \text{ l} = 0,00165 \text{ mol}$
 $c(\text{NaOH}) = n / V = 0,00165 \text{ mol} / 0,02 \text{ l} = \mathbf{0,0825 \text{ mol/l}}$
 $n = c \times V = 0,0825 \text{ mol/l} \times 0,1 \text{ l} = 0,00825 \text{ mol}$
 $m = n \times M = 0,00825 \text{ mol} \times 40 \text{ g/mol} = \mathbf{0,33 \text{ g}}$