Task:

What volume of Ammonia is evolved when Ammonium chloride is passed through 1.48 grams of CalciumHydroxide

Solution:

The chemical equation of the reaction is

$2NH_4Cl + Ca(OH)_2 = CaCl_2 + 2NH_3 + 2H_2O$

The number of moles of $Ca(OH)_2$ is

$n(mol) = m(g) / MW(g/mol)$

$MW(Ca(OH)_2) = AW(Ca) + 2 \cdot AW(O) + 2 \cdot AW(H) = 40 + 2 \cdot 16 + 2 \cdot 1 = 74$ g/mol

$n(Ca(OH)_2) = 1.48 / 74 = 0.02$ mol

According to the chemical equation the number of moles of NH3 is

$n(NH_3) = 2 \cdot n(Ca(OH)_2) = 2 \cdot 0.02 = 0.04$ mol

The volume of NH_3 at STP is

$V(L) = n(mol) \cdot V_0(L)$

$V_0(L) = 22.4L$ – the volume of 1 mol of gas at STP (p= 1atm, T= 273K)

$V(L) = 0.04 \cdot 22.4 = 0.896$ L

Answer: V(L) = 0.896 L