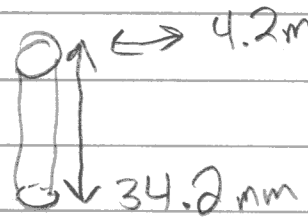
Calculate Quantities of Mg & B Powder for reaction to MgB_2 in Quartz tube

Tube inner volume: 

$V \approx 475\ mm^3$

for 1.2 times the inner volume → Total Volume of Mg+B powder should be ~ $570\ mm^3$ ~ 0.6 mL ~ 0.6 cc

1 mL = 1 cc

Molar Mass of Mg ≡ 24.305 g_{mg}/mol_{mg}

Molar Mass of B ≡ 10.811 g_B/mol_B

Density of Mg ≡ 1.738 g_{mg}/cc_{mg}

Density of B ≡ 2.37 g_B/cc_B

Molar mass of MgB_2 ≡ 45.927 g_{MgB_2}/mol_{MgB_2}

$Mg \equiv 1.738\ g_{mg} / cc_{mg}$

$2B \equiv 4.74\ g_{B} / cc_{B}$

$Mg(2B)|_{unreacted} \cong 6.478\ g_{mg(2B)} / cc_{Mg(2B)}$

$MgB_2|_{reacted} \equiv 2.57\ g_{MgB_2} / cc_{MgB_2}$

*** Total mass of unreacted $Mg(2B)$ powder $\equiv 3.89\ g_{Mg(2B)}$ to fill tube.

Molar Mass of $Mg(2B) \equiv$ Molar Mass of MgB_2

$$3.89\ g_{Mg(2B)} \cdot \frac{1\ Mol_{Mg(2B)}}{45.927\ g_{Mg(2B)}} = 0.085\ Mol_{Mg(2B)}$$

$0.085\ Mol_{Mg} \equiv$ **2.066 g_{Mg}**

$0.085\ Mol_{2B} \equiv 0.17\ Mol_{B} \equiv$ **1.838 g_{B}**

To make other samples mix B:Mg in a 1:1.124 ratio by weight.