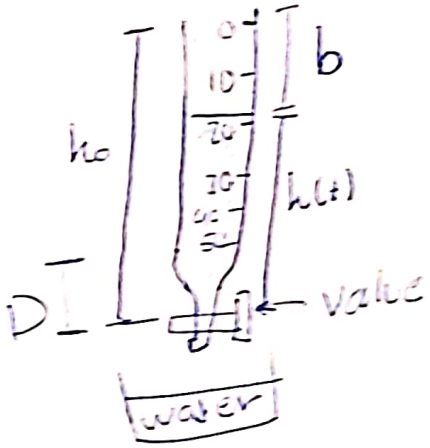
Exp 8

The aim: measure the decay constant and half-life of a draining water

Theory:-



at $t=0$ $h(t)=h_0$

when the value opens

→ the water will start draining out of the tube

$$-\frac{dh}{dt} \propto h(t)$$

$$\frac{dh}{dt} = -\lambda h(t)$$

$$\int_{h_0}^{h(t)} \frac{dh}{h} = \int_0^t -\lambda \, dt$$

$$\boxed{h(t) = h_0 e^{-\lambda t}}$$

h_0 = 50 units + D in Burette

$h_0(b) \longrightarrow h_0$ cm

$X \longleftarrow D$ cm

half-life

$t_{1/2} \Rightarrow$

$$\frac{h_0}{2} = h_0 e^{-\lambda t_{1/2}}$$

$$\ln 2 = -\lambda t_{1/2}$$

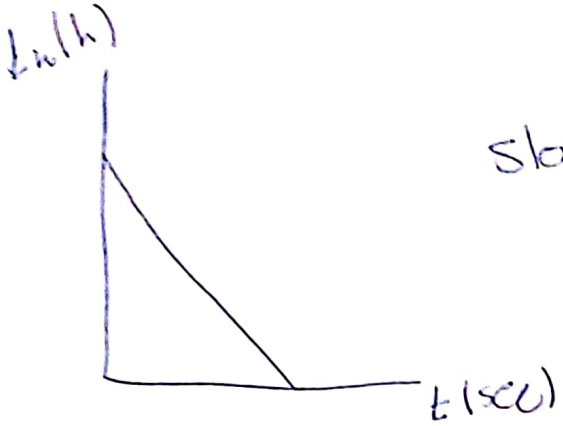
$$\boxed{t_{1/2} = \frac{\ln 2}{\lambda}}$$

Calculation:

time	b_1	b_2	b_2	$\bar{b}$	$h(t) = (h_0 - \bar{b})$	$\ln(h)$
0						
10						
20						
30						
⋮						
180						

notic that b : empty volume

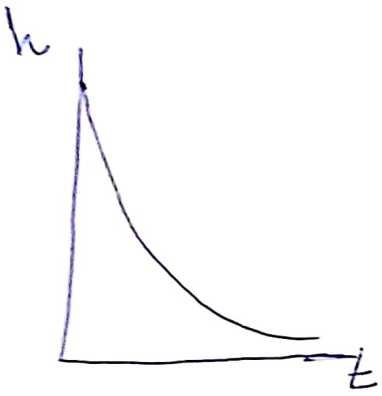
to have the hieght = $h_0 - \bar{b}$



slope $= -\lambda$

$t_{1/2} = \frac{\ln 2}{\lambda}$

intercept $= \ln(h_0)$



obtain 6 values of $t_{1/2}$

$\overline{t_{1/2}}$