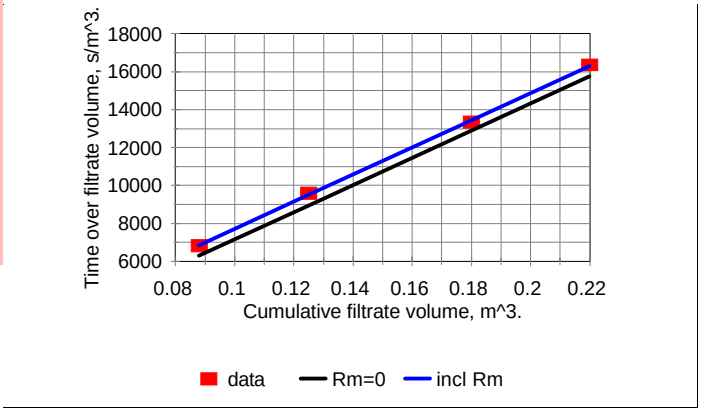
Question - Cake Filtration

Pilot filter area:	0.1	m^2	i.e A
Filtration pressure:	**********	Pa	i.e DP
Filtrate viscosity:	0.0015	Pa s	i.e. u
Slurry concentration:	3	%w/w	i.e. sx100%
Cake concentration:	52	w/w	
Liquid density:	1000	kg/m^3	i.e p

********** Calculated values: **********

Moisture ratio:	1.923077		i.e m (mass wet cake over dry, i.e 100/52 kg/kg)
Dry solids per unit volume:	31.83673	kg/m^3	(c=sp/(1-ms))

Filt'n time (min)	Filtrate volume (m^3)	Time/Vol (s/m^3)	Neglect medium fitted time/Vol (s/m^3)	Include medium fitted time/Vol (s/m^3)
10	0.088	6818.182	6306.115	6852.947
20	0.125	9600	8957.55	9504.381
40	0.18	13333.33	12898.87	13445.7
60	0.22	16363.64	15765.29	16312.12



Intercept on plot:	546.8311	s/m^3	
Correlation coefficient:	0.999512		
Gradient on plot:	71660.4	s/m^6	
Specific resistance to filtration:	2.1E+10	m/kg	(alpha=gradient*2*A^2*DP/u*c)
Medium resistance:	2.5E+10	1/m	(Rm=intercept*A*DP/u)

Area changes by a factor of 100 thus changes are:

to gradient:	divide by 10000
to intercept:	divide by 100

Hence new equation is: t/V=(19.9/10000)V+0.152/100

Scale up: - solving above equation for t of 2 hours

Filtration time:	2	hours	
	7200	s	
Neglecting Rm V will be:	31.69762	m^3	
Including Rm, V will be:	31.31837	m^3	i.e medium resistance is negligible

Cake thickness:	New area:	10	m^2	
Solid density is:		2500	kg/m^3	
Given mass concentration, the volume fraction is:		0.302326	v/v	
Dry mass of solids deposited:		997.0747	kg	(i.e cV)
Volume solids in cake		0.39883	m^3	
Total volume of cake (including voids):		1.319206	m^3	
So, cake depth (volume over area):		0.131921	m	