EXP9Adsorption from Solution

(1) For each flask, calculate

(a)c, the final equilibrium concentration of the absorbate (acetic acid);

(b)x, the weight of acetic acid removed by absorbent;

(c)xm, the amount of adsorption per m grams of activated charcoal.

(sol)

計算標定平均 N_{NaOH} = ?

計算標定平均 N_{HOAc} = ?

計算 HOAc 吸附前濃度=

計算 HOAc 吸附後濃度 $N_1V_1=N_2V_2$

被吸附的重量 x = (Nf- Ni)・V・M_{HOAc} 其中 V=100X10^{-3}L ，M=60g/mol

(2) Plotx/m against c.

計算 x/m 列表及作圖 C VS. x/m

	C5	C10	C20	C50	C100
C					
x/m					

(3) Test the applicability of the Freundlich isotherm by plotting log(x / m) against logc. Calculate constants k and n in Eq. (2).

(sol)Freundlich isotherm log(x/m) = nlogc + log k

列表及作圖 logc VS. log(x/m) 需線性回歸

	C5	C10	C20	C50	C100
logc					
log(x/m)					

k =

(4) Test the applicability of the Langmuir isotherm by plotting c/(x/m) against c. Calculate constants and in Eq. (3).

(sol)Langmuir isotherm

C_{final}/ x/m = 1/α + βc/ α

計算 C/(x/m) 列表後作圖需線性回歸

	C5	C10	C20	C50	C100
C_{final}					
C_{final}/ x/m					

1/α =

βc/ α = β =

Exp 9

1.數據：

(1)Standardization

(a)Standardization of 0.25N NaOH

	Run 1	Run 2
Wt. of KHP(g)	0.503	0.503
V_{NaOH}	10.3	9.7

(b) Standardization of 0.5N HOAc

	Run 1	Run 2
V_{NaOH}	20	20
V_{HOAc}	39.1	39.2

計算

(1)標定 0.25N NaOH

KHP 分子量：204.228 g/mol

Run 1：$C_{NaOH} \times \frac{10.3}{1000} = \frac{0.503}{204.228}$

C_{NaOH}= 0.239 (M)（捨棄）

Run2：$C_{NaOH} \times \frac{9.7}{1000} = \frac{0.503}{204.228}$

C_{NaOH}= 0.254 (M)

(2)標定 HOAc

$C_1V_1 = C_2V_2$

Run1：$0.254 \times 39.1 = 20 \times C_{HOAc}$

C_{HOAc}=0.49657 (M)

Run2：$0.254 \times 39.2 = 20 \times C_{HOAc}$

C_{HOAc}=0.49784 (M)

C_{HOAc} 平均=0.497(M)

2.數據：

(2)

	C_0	C_5	C_{10}	C_{20}	C_{50}	C_{100}
V_{HOAc}（mL）	0	5	10	20	50	100
V_{water}（mL）	100	95	90	80	50	0
Charcoal Wt.		2.062	2.106	2.064	2.112	2.120
Vsol'n for titration(mL)	25	25	25	25	25	25
		1.00	3.00	7.1	19.8	41.4

計算：

$C_1V_1 = C_2V_2$

以 C_5 為例：

HOAc 吸附前濃度

$0.497\times5=C_5\times100 \rightarrow C_5= 0.00497$ (M)

HOAc 吸附後濃度

$0.254\times1.0 = C_5\times25 \rightarrow C_5= 0.01016$ (M)

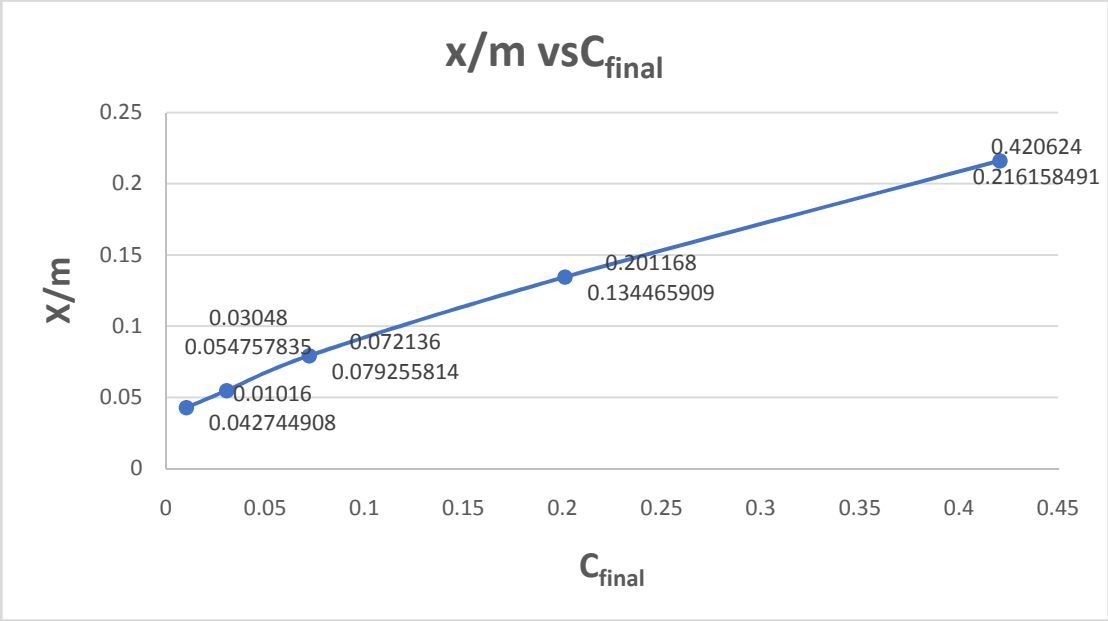
HOAc 被吸附的重量 $X=(C_{final}-C_{initial})\times V\times M_{HOAc}$

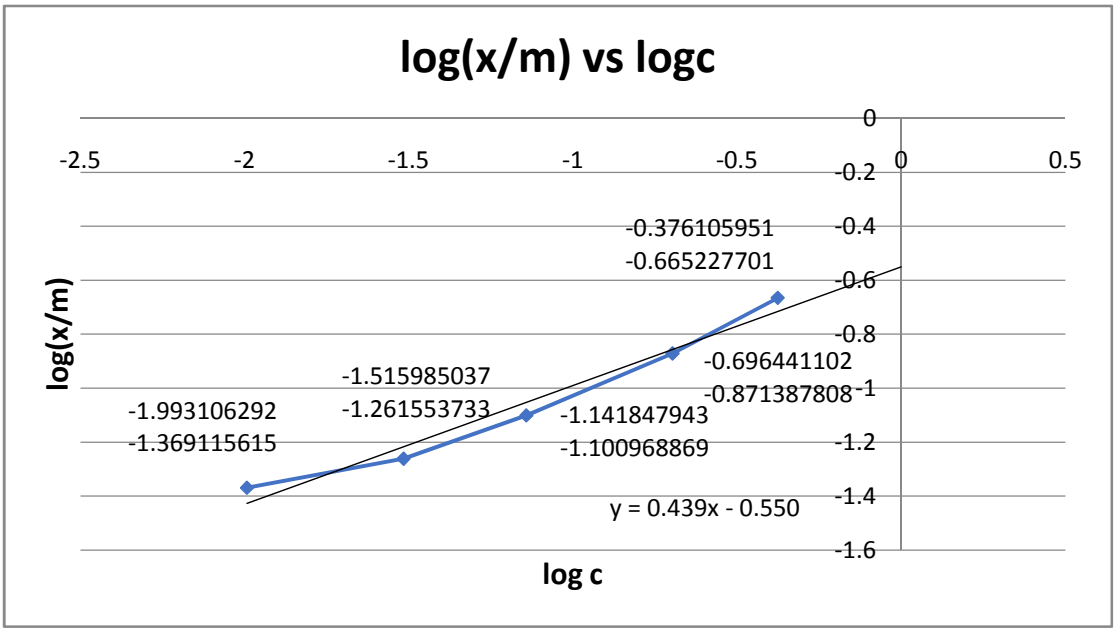
$C_5=(0.01016-0.00497)\times\frac{100}{1000}\times60 =0.008814$

$\frac{x}{m(\text{Charcoal Wt.})} =\frac{0.008814}{2.062} = 0.0427$

計算：

3.Freundlich isotherm $\rightarrow \log(\frac{x}{m}) = n\log c + \log k$





線性迴歸：

y = 0.4395x-0.5505

n=0.4395

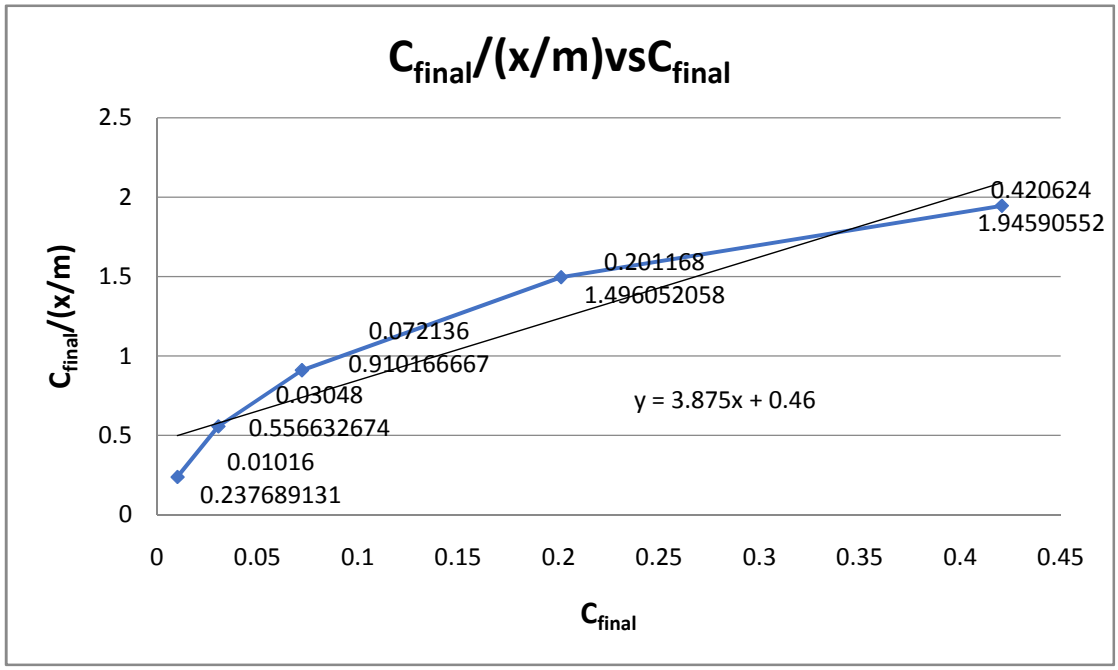
log k = -0.5505

k =$10^{-0.5505}$= 0.2815

計算：

4.Langmuirisotherm

$\frac{C_{final}}{x/m} = \frac{1}{\alpha} + \frac{\beta}{\alpha} c$



y=3.8752x + 0.46

$\frac{1}{\alpha}$ =0.46→ α=2.174(M^{-1})

$\frac{\beta}{\alpha}$ = 3.8752 → β=8.424(M^{-1})