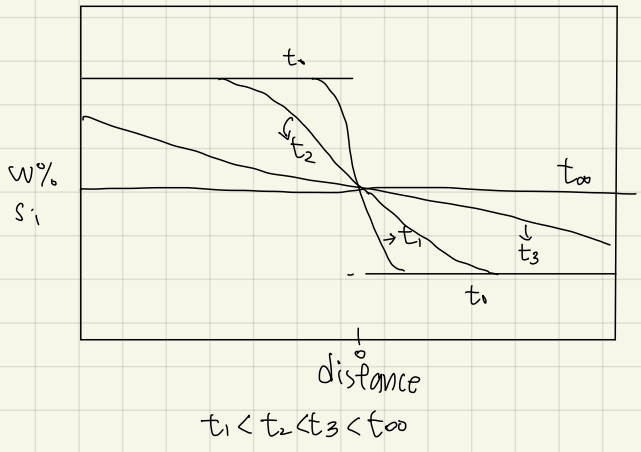
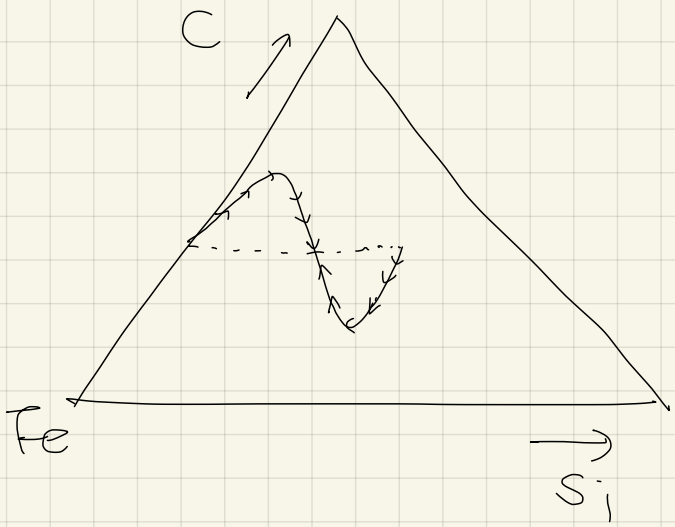
1.



$t_1 < t_2 < t_3 < t_\infty$



At longer times
→ lack of discontinuity

2. (1) diffusion coefficient in 1173 K

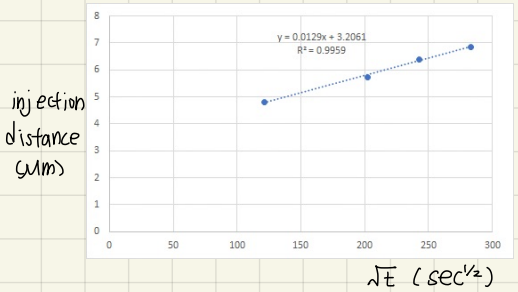
R : 8.314

$4.529 \times 10^{-7} \times \exp[-147723/RT]$

$= 1.195 \times 10^{-13}\ m^2/s = 1.195 \times 10^{-9}\ cm^2/s$

e(um)

t	injection distance
5182.448057	23
10364.89612	33
15547.34417	41
20729.79223	47



(injection distance) $\propto \sqrt{t}$ 인 것을 알수 있다.

(2)

diffusion coefficient in 1173k : $1.195 \times 10^{-9}\ cm^2/s$

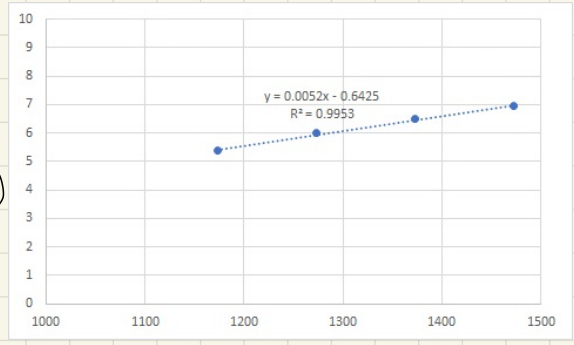
in 1273k : $3.929 \times 10^{-9}\ cm^2/s$

in 1373k : $1.086 \times 10^{-8}\ cm^2/s$

in 1473k : $2.614 \times 10^{-8}\ cm^2/s$

t = 3hr

T	injection distance	ln((injection distance))
1173	33	3.496507561
1273	61	4.110873864
1373	120	4.787491743
1473	159	5.068904202



ln (injection distance) $\propto$ T 인 것을 알수 있다

(3) $x = \sqrt{Dt}$ (x: diffusion distance)

$D = D_0 \exp\frac{-Q}{RT}$ (Q: activation energy)

$x^2 = D_0 t \exp\left(-\frac{Q}{RT}\right)$

$\ln x^2 = \ln(D_0 t) - \frac{Q}{RT}$

$\ln x_1^2 = \ln(D_0 t) - \frac{Q}{RT_1}$

$\ln x_2^2 = \ln(D_0 t) - \frac{Q}{RT_2}$

$2\ln\frac{x_1}{x_2} = \frac{Q}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$

T_1 1173K, T_2 1273K 일 때

$Q = 2\ln\left(\frac{x_1}{x_2}\right) R \frac{1}{\left(\frac{1}{T_2} - \frac{1}{T_1}\right)} = 2\ln\left(\frac{33}{61}\right) \times 8.314 \times \frac{1}{\frac{1}{1273} - \frac{1}{1173}} = 152543\ \text{J}$

주어진 Q : 140123J, 계산된 Q : 152543J → 10% 이내의 차이