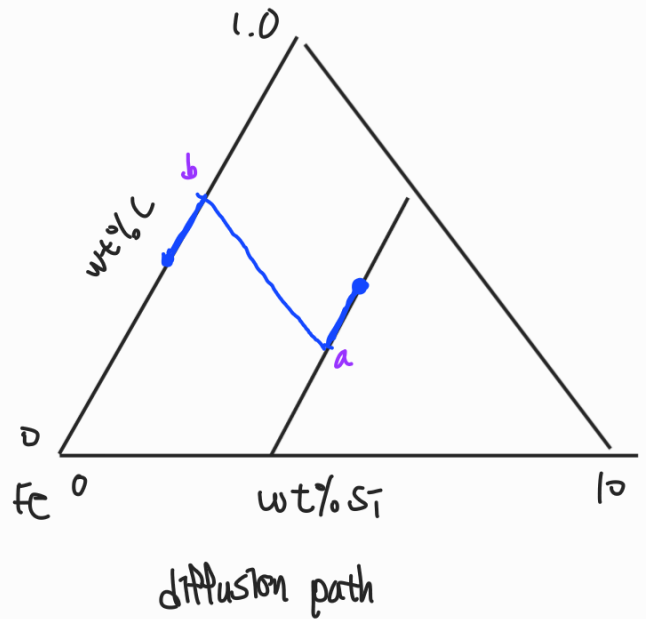
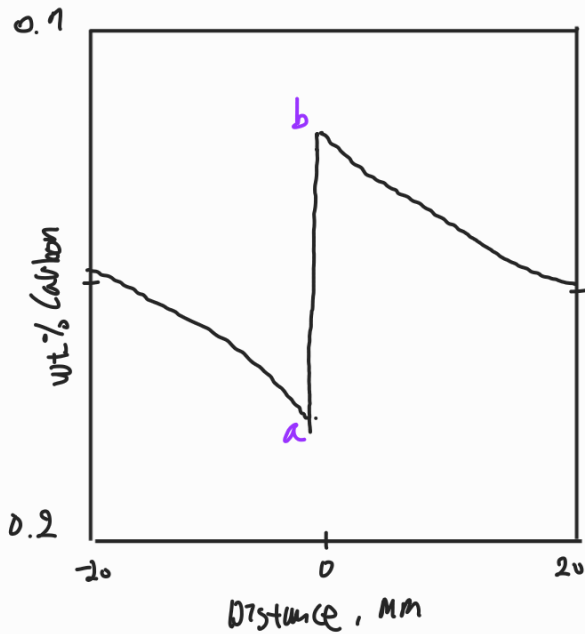


phase transformations problem set #3

20222102 오바타

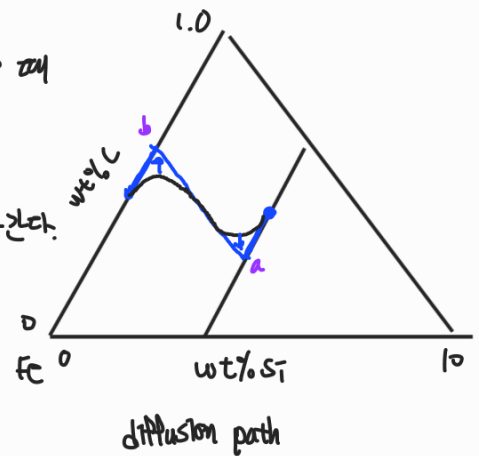
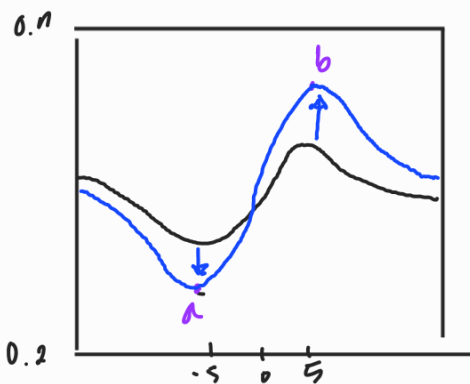
1. (1) 13 days annealing time



(2) Si가 10mm 위치 non-zero gradient 있을 때.

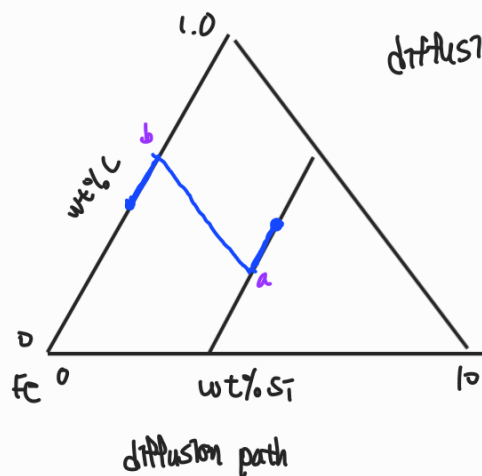
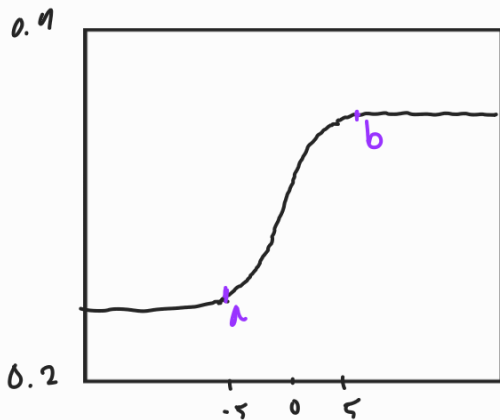
i) C가 철 중심에서 13일 정도 가열될 때

Si 조성 gradient가 생겼을 때
diffusion path가 처음에는
검정을 따라 가지만 시간이
지날에 따라 파란선을 따라간다.



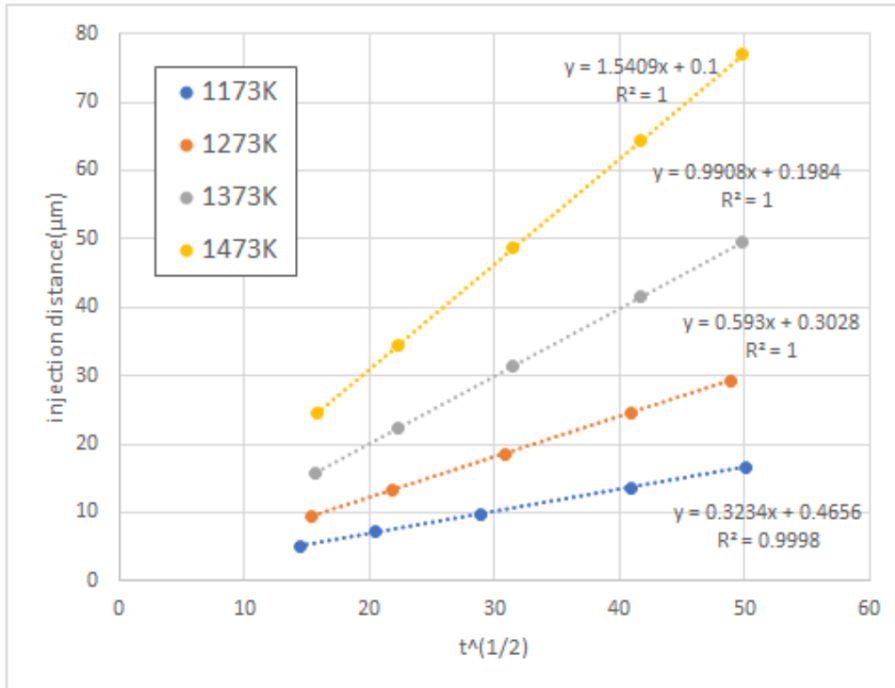
ii) Si가 non-zero gradient가 될 시엔 C도 diffusion 할 때

diffusion path는 변하지 않는다.



2.

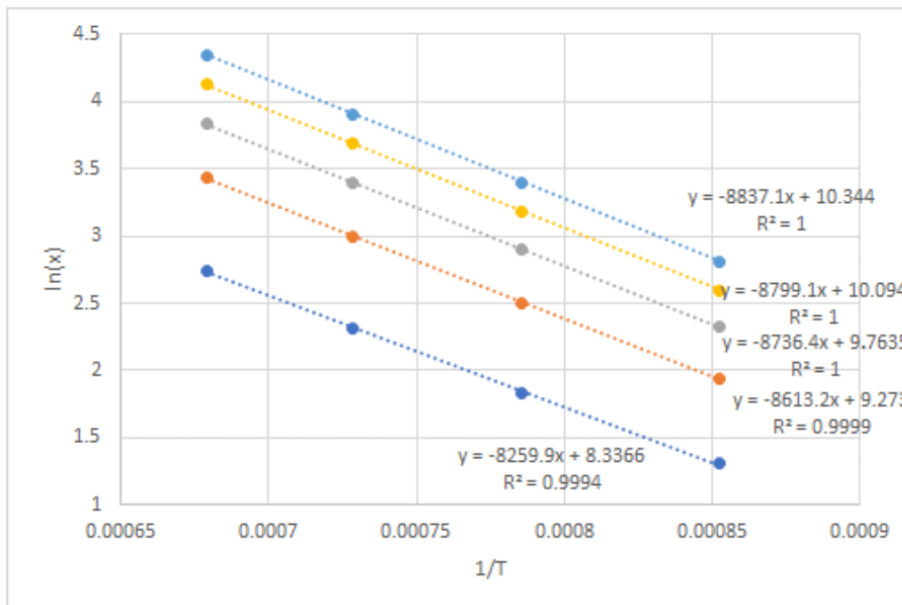
(a)



injection distance = 21. ~~21.2~~ μm

$$x \propto \sqrt{t}$$

(b)



$$\ln x = a + b \times \frac{1}{T}$$

(c)

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

$$\ln x = \frac{1}{2} \ln D_0 t - \frac{Q}{2R} \cdot \frac{1}{T}$$

$$Q = -2R \times (\text{slope of the line})$$

$$= 143817.9 \text{ J}$$

$$\text{Error}(\%) = 2.64 \%$$