

淡江大學 100 學年度轉學生招生考試試題

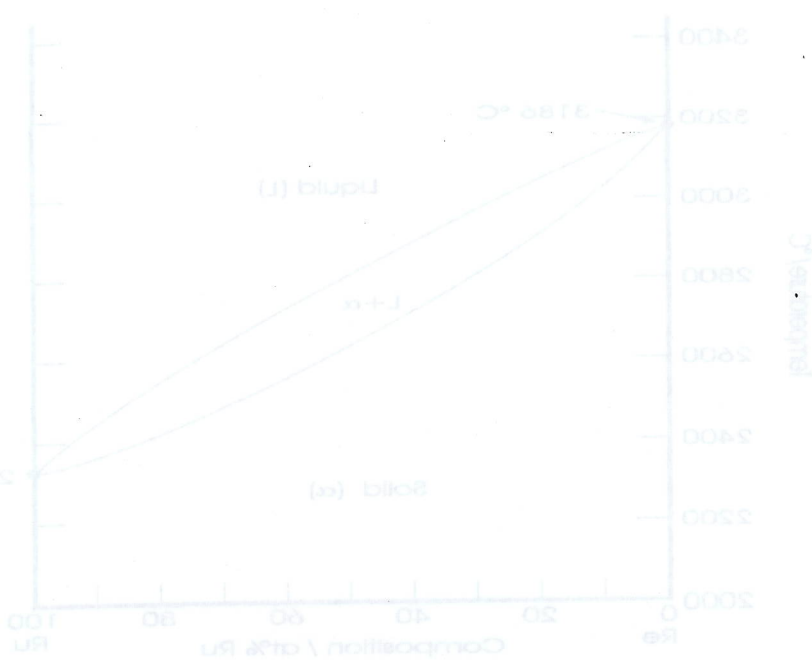
系別：化學工程與材料工程學系三年級 科目：物理化學 45-1

考試日期：7月19日(星期二) 第3節

本試題共 4 大題，2 頁

Problem Four (40 points)

- (a) Calculate the change in entropy (JK^{-1}) when 25 kJ of energy is transferred reversibly and isothermally as heat to a large block of iron at 100°C .
- (b) Calculate the molar entropy ($\text{JK}^{-1}\text{mol}^{-1}$) of a constant-volume sample of neon at 500 K given that the entropy is $146.22 \text{ JK}^{-1}\text{mol}^{-1}$ at 298 K. $C_{p,m} = 20.786 \text{ JK}^{-1}\text{mol}^{-1}$
- (c) Calculate ΔS (for the system) (JK^{-1}) when the state of 3 mol of perfect gas atoms, for which $C_{p,m} = \frac{5}{2}R$, is changed from 25°C and 1 atm to 125°C and 5 atm.
- (d) Calculate ΔH (J) and ΔS_{tot} (JK^{-1}) when two copper blocks, each of mass 10 kg, one at 100°C and the other at 0°C , are placed in contact in an isolated container. The specific heat capacity of copper is $0.385 \text{ JK}^{-1}\text{g}^{-1}$ and may be assumed constant over the temperature range involved.



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45-2

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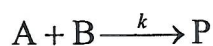
本試題共 4大題，2 頁

Problem One (20 points)

Estimate the wavelength (m) of electrons that have been accelerated from rest through a potential difference of 40 kV. $1 \text{ eV} = 1.60218 \times 10^{-19} \text{ J}$.

Problem Two (20 points)

Consider the reaction



where P denotes the product, and the initial concentrations are $[A]_0$ and $[B]_0$. If the reaction rate

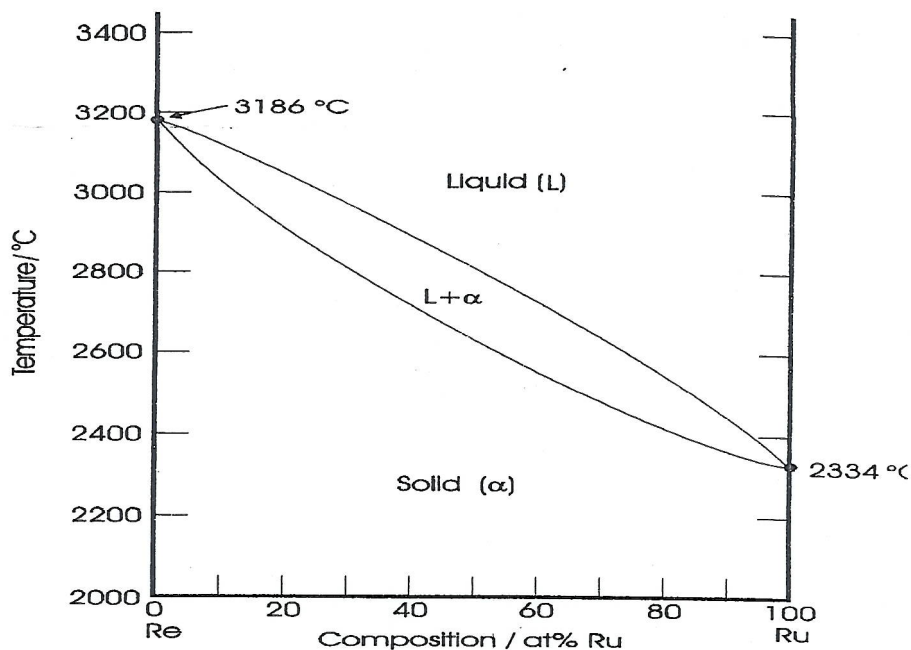
follows $\frac{d[A]}{dt} = -k[A][B]$, show that at a time t after the start of the reaction, the concentrations

satisfy the relation

$$\ln \left(\frac{[B]/[B]_0}{[A]/[A]_0} \right) = ([B]_0 - [A]_0)kt$$

Problem Three (20 points)

With respect to the Ru-Re phase diagram shown below, the sample made up with 60 at% Ru is cooled slowly to 2700 °C. (a) What phases are present at 2700 °C? (b) What is the composition of Ru in each phase? (c) How much (%) of each phase is present?



背面尚有試題

本試題雙面印刷