國立高雄科技大學 113 學年度碩士班招生考試　試題紙

系 所 別：化學工程與材料工程系碩士班　　組　別：丙組

考科代碼：2016　　考　科：熱力學

注意事項：

1、筆試可使用電子計算器之科目，由本校提供，**考生不得使用自備計算器**，違者該科不予計分。

2、請於答案卷上規定之範圍作答，違者該題不予計分。

Given: R= 8.314 J/K mol= 0.08206 L atm/K mol

ln(2)= 0.6931, ln(3)=1.0986, ln(5)=1.6094, ln(7)=1.9459, ln(10)= 2.3026

1. 請將以下的熱力學名詞中翻英 (please translate the following terms into English)
   (a) 焓 (3%)
   (b) 狀態函數 (3%)
   (c) 平衡 (3%)
   (d) 自發過程 (3%)
   (e) 規則溶液 (3%)
2. Please describe the meaning of the following terms.
   (a) Activity coefficient (5%)
   (b) Hess's law (5%)
   (c) The Gibbs phase rule (5%)
   (d) Third law of thermodynamics (5%)
   (e) Reversible process (5%)
3. The heat capacity of water is given as follows.
   $C_p = 75.3\ (J/mol \cdot K)$
   If the water is heated from 280K to 330K,
   (a) please calculate the enthalpy change of the water ? (5%)
   (b) please calculate the entropy change of the water ? (5%)
4. A 1 mol of hydrogen gas is heated at constant pressure from 300K to 420K. Please calculate
   (a) the energy transferred the gas by heat. (5%)
   (b) the increase in its internal energy. (5%)
   (c) the work done on the gas. (5%)
5. 0.3 moles of gold (Au) and 0.7 moles of silver (Ag) are mixed to form a single-phase ideal solid solution. Please answer the following questions.

(a) What is the molar enthalpy change of mixing ? (5%)

(b) What is the molar entropy change of mixing ? (5%)

(c) What is the change in Gibbs free energy during the mixing at 400K ? (5%)

6. Calculate the number of degrees of freedom at the triple point of water. (10%)

7. At the normal melting temperature of lead (Pb), the molar volumes of solid and liquid lead (Pb) are 18.92 cm^3/mol and 19.47 cm^3/mol, respectively. How much does the additional pressure need to be applied to increase the melting temperature of lead (Pb) by 20°C ? (10%)