

# 國立虎尾科技大學九十八學年度研究所（碩士班）入學試題

所別：生物科技系碩士班

科目：考試科目 2（生物科技概論與普化化學）

注意事項：

- (1) 本試題共有 10 題，每題配分如題目所述，合計 100 分。  
(2) 請依序作答在答案卷上並註明題號。

1. 解釋名詞（簡略說明其功能，意義及可應用性） (10%)
  - a. ELISA
  - b. Stem cells
  - c. RT PCR
  - d. GMO
  - e. Transcription
2. Please give at least five functions and examples of microorganism to explain how the microbial / micro-biotechnology were used to improve agriculture, medicine, food, environmental protection and industry in human society? (10%)
3. What is the last results if we use EcoRI first and then use HaeIII to cut DNA fragment "AAGTTGGCCCTTCGCGAATTCGGCCGC". (HaeIII 5'GG↓CC 3' ; EcoRI 5'G↓AATTC3') (10%)
4. a. 何謂純培養(pure culture) ，並敘述如何獲得細菌之純培養？(5%)  
b. 大腸桿菌菌液經稀釋後，各取  $10^{-4}$ 、 $10^{-5}$ 、 $10^{-6}$  之菌液 0.1 ml 塗抹於 3 個固體培養平碟上，隔夜培養後  $10^{-4}$  平碟長出 1120 顆菌落， $10^{-5}$  平碟長出 288 顆菌落， $10^{-6}$  平碟長出 41 顆菌落，計算出原始菌液之菌數(CFU/ml)？(5%)
5. 何謂 Monoclonal antibody？如何生產 Monoclonal antibody？ (10%)
6. Name each of the following compounds. (10%)
  - (a)  $\text{PCl}_3$
  - (b)  $\text{SO}_3$
  - (c)  $\text{Fe}(\text{NO}_3)_3$
  - (d)  $\text{CoBr}_2$
  - (e)  $\text{Cr}_2\text{O}_3$
7. Given the following data (10%)
$$\text{Fe}_2\text{O}_3 (\text{s}) + 3\text{CO} (\text{g}) \rightarrow 2\text{Fe} (\text{s}) + 3\text{CO}_2 (\text{g}) \quad \Delta H^\circ = -23 \text{ kJ}$$
$$3\text{Fe}_2\text{O}_3 (\text{s}) + \text{CO} (\text{g}) \rightarrow 2\text{Fe}_3\text{O}_4 (\text{s}) + \text{CO}_2 (\text{g}) \quad \Delta H^\circ = -39 \text{ kJ}$$
$$\text{Fe}_3\text{O}_4 (\text{s}) + \text{CO} (\text{g}) \rightarrow 3\text{FeO} (\text{s}) + \text{CO}_2 (\text{g}) \quad \Delta H^\circ = +18 \text{ kJ}$$
Calculate  $\Delta H^\circ$  for the reaction:
$$\text{FeO} (\text{s}) + \text{CO} (\text{g}) \rightarrow \text{Fe} (\text{s}) + \text{CO}_2 (\text{g})$$

8. Mixtures of helium and oxygen can be used in scuba diving tanks to help prevent "the bends". For a particular dive, 46 L He at 25°C and 1.0 atm and 12 L O<sub>2</sub> at 25°C and 1.0 atm were pumped into a tank with a volume of 5.0 L. Calculate the partial pressure of each gas and the total pressure in the tank at 25°C. (1 atm = 760 torr, 0°C = 273.15 K, O = 16.00, He = 4.00, R = 0.08206 atm·L/mol·K)

(10%)

9. Give the formula of the following compounds. (10%)

(a) Sulfur hexafluoride

(b) Mercury (I) chloride

(c) Sodium hydrogen carbonate

(d) Hypochlorous acid

(e) Dioxygen difluoride

(f) Manganese (IV) oxide

10. Write the electron configuration for the following atoms: (10%)

Br, Mg, Xe, Cr, and K.