



系組：化材系乙丙組

准考證號碼：□□□□□□□□

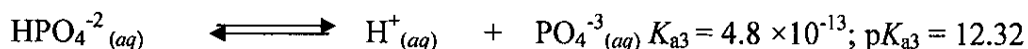
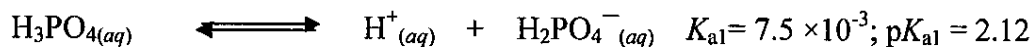
科目：化學

(請考生自行填寫)

注意事項	<p>一、請先檢查准考證號碼、報考系(組)別、考試科目名稱，確定無誤後再作答。</p> <p>二、所有答案應寫於答案紙上，否則不予計分。</p> <p>三、作答時應依試題題號，依序由上而下書寫，作答及未作答之題號均應抄寫。</p>
------	---

$R=0.0821 \text{ atm}\cdot\text{L}/\text{mol}\cdot\text{K} = 8.314 \text{ J}/\text{mol}\cdot\text{K}$, $1\text{atm} = 760 \text{ mmHg}$

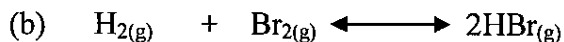
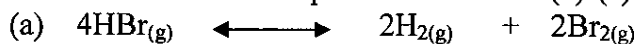
1. Describe how you would prepare a “phosphate buffer” with a pH of 7.40. (7%)



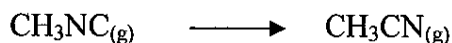
2. For the following reaction, $K_p = 1.4 \times 10^{-5}$ at 700 K.



What are the values of K_p for the reactions (a)-(c) at the same temperature? (9%)



3. CH_3NC undergoes a first-order reaction to form CH_3CN . The reaction was studied at 199°C . The initial concentration of CH_3NC was 0.0258 mol/L and after 11.4 min, analysis showed the concentration of the product CH_3CN to be $1.30 \times 10^{-3} \text{ mol/L}$. (9%)



(a) What is the first-order rate constant?

(b) How long will it take for 90% of the CH_3NC to react?

(c) Using the rate constant to calculate the half-life of CH_3NC .

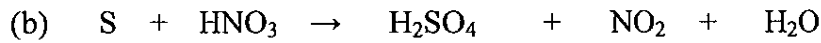
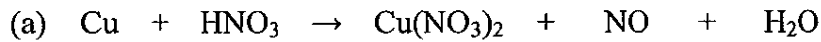
4. Determine the empirical formula of a compound having the following percent composition by mass:

K: 24.75%; Mn: 34.77%; O: 40.51% (K=39, Mn=55, O=16) (10%)

5. A 40.0 g sample of water ($s = 4.184 \text{ J/g}\cdot^\circ\text{C}$) at 12°C is mixed with 60.0 g of water at 87°C . Calculate the final temperature of the mixture assuming no heat loss to the surroundings. (10%)

(!請注意，背後有題目!)

6. Balance these equations: : (10%)



7. 利用酸鹼觀念推測下列的溶液是酸性，鹼性或中性，並簡略說明之。(14%)

(a) NH_4I (b) KCN (c) CaCl_2 (d) CH_3COONa (e) KI (f) LiClO_4 (g) Na_3PO_4

8. 將 16.0 g 的 MgSO_4 與 100mL 的水在 25°C 下混合，水本身的密度在 25°C 為 0.997 g/mL，試求

(a) 溶液中 MgSO_4 的重量百分比？(2 %)

(b) 溶液的重量莫耳濃度(m)？ $\text{Mg} = 24.31$, $\text{O} = 16.00$, $\text{S} = 32.07$, $\text{H} = 1.01$ (3 %)

(c) 溶液的體積莫耳濃度(M)？假設此溶液的密度在 25°C 為 0.998 g/mL。(3 %)

(d) 計算此溶液在 25°C 時的蒸氣壓？若純水在 25°C 時的蒸氣壓為 31.7mmHg。(3 %)

9. 將 0.760 g 含 Ba^{2+} 的未知化合物溶於水，加入過量的 Na_2SO_4 ，若產生 0.430 g BaSO_4 沉澱，求未知化合物中 Ba 的重量百分率為何？($\text{Ba}=137$ ， $\text{BaSO}_4=233$) (10%)

10. 試求在 730 mmHg 及 50°C 下， HBr ($\text{MW}=81$ g/mol) 分子的密度？(10%)