

1. Balance the following chemical equations: 20%
平衡下列方程式:
(a) $\text{Fe(s)} + \text{NO}_3^-(\text{aq}) + \text{H}^+(\text{aq}) \rightarrow \text{Fe}^{3+}(\text{aq}) + \text{NO(g)} + \text{H}_2\text{O(l)}$
(b) $\text{CrO}_4^{2-}(\text{aq}) + \text{Mg(s)} + \text{H}^+(\text{aq}) + \text{H}_2\text{O(l)} \rightarrow \text{Cr(OH)}_3(\text{s}) + \text{Mg(OH)}_2(\text{s})$
2. Write chemical formulas for the following compounds: 25%
寫出下列化合物的化學式:
(a) ozone
(b) ammonium hydroxide
(c) iodine trichloride
(d) hydrofluoric acid
(e) potassium perbromate
3. 說明化學平衡與 Gibbs free energy ΔG 的關係。 9%
4. Explain the following chemical terms: 24%
解釋下列化學名詞:
(a) atomic mass
(b) activation energy
(c) empirical formula
(d) Lewis base
(e) van der Waals equation
(f) molality
5. 略述化學在生命科學的應用。 10%
6. Identify each of the following as a strong or weak base: 12%
指出下列各化合物為強酸、弱酸、強鹼、或弱鹼:
(a) $\text{NH}_3(\text{aq})$ (b) H_3BO_3 (c) Ca(OH)_2 (d) $\text{FeCl}_3(\text{aq})$