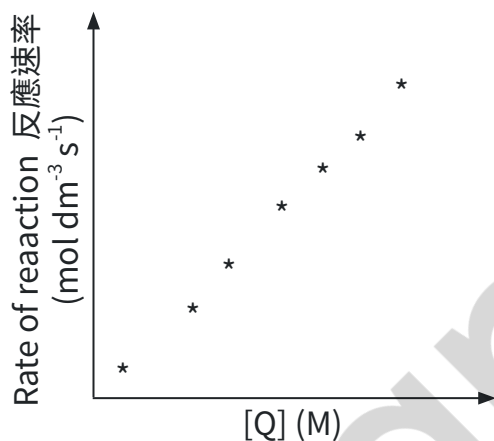


Exercise 1

練習 1

There is a reaction $P(aq) + 2Q(aq) \rightarrow R(aq)$. Here shows the Rate - [Q] graph of reaction.

有一個反應是 $P(aq) + 2Q(aq) \rightarrow R(aq)$ 。圖中展示了 速率 - [Q] 的圖表。



a. Deduce the order of reaction of Q and explain.

估算 Q 的反應級數 以及解釋。

Experiment no. 實驗次序	Initial concentration of reactant 反應物的初始濃度		Rate of reaction 反應速率 (mol dm ⁻³ s ⁻¹)
	[P] (aq)	[Q] (aq)	
1.	0.5 M	0.3 M	3 × 10 ⁻³
2.	0.6 M	0.9 M	0.01296

b. The rate and concentration of reactant is shown below. Determine the rate equation.

反應速率以及反應物的濃度被列在下面表格中。請推斷出 反應方程。

c. What is the rate when [P] = 0.2M, [Q] = 1M?

請問 [P] = 0.2M, [Q] = 1M 時候 的反應速率是什麼？



Optimize Reaction rate and equilibrium 優化反應速率與化學平衡
[2012(1aiii, iv), 2016(1ai), 2017(1bii2I)]

An industrial process does not only focus on the yield, but also the reaction rate, not to mention the cost. It is important to strike a balance among these 3 consideration factors.

留意工業過程不是單純只著重在產率，反應速率也是十分重要，當然成本也是要考慮的因素。因此，我們需要在 3 者之間取一個平衡。

The reason for using a high temperature at exothermic reaction (which the yield is favorable at low temperature) is to speed up the reaction rate.

在放熱反應中使用高的溫度 (在溫度低的情況下產率是比較高的) 是為了提高反應速率。

The reaction chamber is set at a low pressure for reaction that creates less gas molecules (which is favorable at high pressure), the cost of constructing a high pressure system is high.

而在製造比較少氣體分子的反應中的反應室使用比較低的的氣壓 (產率是在高氣壓情況下比較高), 因為使用高氣壓的的系統的成本比較高。

The question is usually asked like this:

通常考試的問題會這樣問：

It is known that production of methanol from syngas

$\text{CO}(\text{g}) + 2 \text{H}_2(\text{g}) \rightleftharpoons \text{CH}_3\text{OH}(\text{g})$ is an exothermic reaction.

我們已知道從合成氣中產生甲醇 $\text{CO}(\text{g}) + 2 \text{H}_2(\text{g}) \rightleftharpoons \text{CH}_3\text{OH}(\text{g})$ 是一個放熱的過程。

The industrial reaction condition is always set at 300° C, 50-100 atm.

工業反應的環境通常設立在 300° C，50-100 atm。