BRITISH COLUMBIA

Chemistry 12
Resource Exam B
Response Booklet

Instructions

Answer the following questions in the space provided in this **Response Booklet**. You are expected to communicate your knowledge and understanding of chemical principles in a clear and logical manner. Your steps and assumptions leading to a solution must be written in this **Response Booklet**. Answers must include units where appropriate and be given to the correct number of significant figures. **For questions involving calculations, full marks will NOT be given for providing only an answer.**

PART B: WRITTEN RESPONSE
Value: 37.5% of the examination

Suggested Time: 40 minutes

1. **(4 marks)**

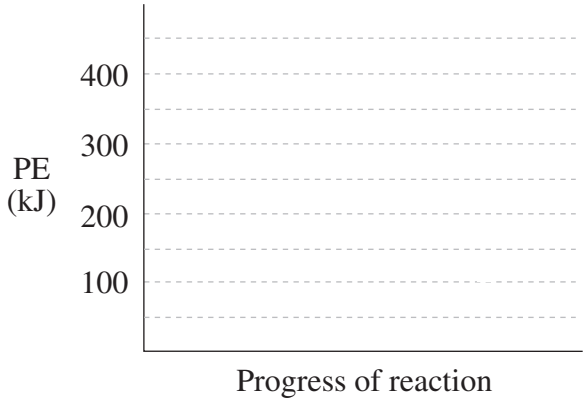
Consider the following values for a catalyzed reaction that goes to completion:

$$\mathrm{PE(products)} = 250\ \mathrm{kJ}$$

$$E_a = 175\ \mathrm{kJ}$$

$$\Delta H = +50\ \mathrm{kJ}$$

Sketch a PE diagram for this reaction on the grid provided, then use a dotted line to show how removing the catalyst would change the PE diagram.

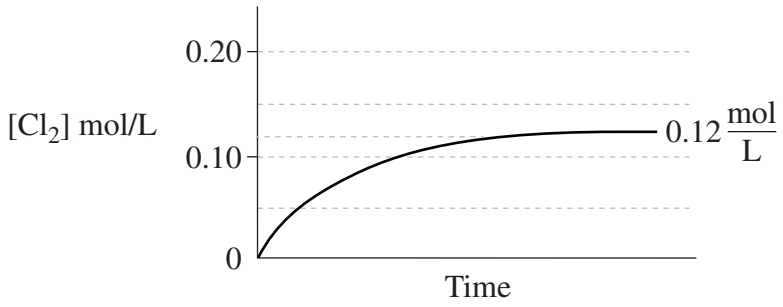


2. **(4 marks)**

Consider the following equilibrium:

$$CCl_4(g) \rightleftarrows C(s) + 2Cl_2(g)$$

A student added 2.40 mol CCl_4 to a 2.00 L flask and monitored the $[Cl_2]$. The following graph was produced.



Calculate the value of K_{eq}.

3. **(4 marks)**

A 0.15 g sample of solid PbF_2 is recovered from 300.0 mL of its saturated solution. What is the K_{sp} of PbF_2 ?

4. **(3 marks)**

Complete the Brønsted–Lowry acid base equation below and predict whether reactants or products will be favoured at equilibrium, and justify your answer.

$HCO_3^- + H_3C_6H_5O_7 \leftrightarrows$ _____

5. **(5 marks)**

Calculate the pH of $0.45\ M\ H_2CO_3$. Start by writing the predominant equilibrium equation.

6. **(3 marks)**

The following two experiments were conducted:

- Titration A: a strong base was titrated with a strong acid.
- Titration B: a weak base was titrated with a strong acid.

How does the pH at the equivalence point of Titration B compare with the pH at the equivalence point of Titration A? Explain.

7. **(4 marks)**

Balance the following in basic solution:

$$I_2 + NO_3^- \rightarrow NH_3 + H_3IO_6^{2-} \qquad \text{(basic)}$$

8. **(3 marks)**

Draw and label the parts of an electrolytic cell capable of copper plating an inert carbon electrode.