

Name of the Student: \_\_\_\_\_

Max. Marks : 16 Marks

Time : 16 Minutes

Q1.

This question is about sulfuric acid and its salts.

- (a) Draw the displayed formula of a molecule of  $\text{H}_2\text{SO}_4$

(1)

- (b) In aqueous solution, sulfuric acid acts as a strong acid. The  $\text{H}_2\text{SO}_4$  dissociates to form  $\text{HSO}_4^-$  ions and  $\text{H}^+$  ions.

The  $\text{HSO}_4^-$  ions act as a weak acid and dissociate to form  $\text{SO}_4^{2-}$  ions and  $\text{H}^+$  ions.

Give an equation to show each stage in the dissociation of sulfuric acid in aqueous solution.

Include appropriate arrows in your equations.

Equation 1 \_\_\_\_\_

Equation 2 \_\_\_\_\_

(2)

- (c) A student is required to make  $250 \text{ cm}^3$  of an aqueous solution that contains an accurately measured mass of sodium hydrogensulfate ( $\text{NaHSO}_4$ ).

Describe the method that the student should use to make this solution.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

---

---

---

---

---

---

---

---

(4)

- (d) A solution that contains 605 mg of  $\text{NaHSO}_4$  in  $100 \text{ cm}^3$  of solution has a pH of 1.72

Calculate the value of  $K_a$  for the hydrogensulfate ion ( $\text{HSO}_4^-$ ) that is behaving as a weak acid.  
Give your answer to three significant figures.

State the units of  $K_a$

$K$  \_\_\_\_\_ Units \_\_\_\_\_

(6)

- (e) Some sodium sulfate is dissolved in a sample of the solution from part (d).

Explain why this increases the pH of the solution.

---

---

---

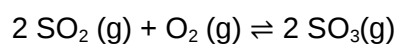
---

---



Q2.

Which change leads to a higher concentration of  $\text{SO}_3$  in this equilibrium mixture?



$$\Delta H = -188 \text{ kJ mol}^{-1}$$

- A** higher concentration of  $\text{O}_2$  ☐
- B** higher temperature ☐
- C** lower pressure ☐
- D** use of a catalyst ☐

(Total 1 mark)