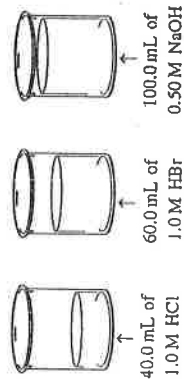


A/B I Written Response Key:

2.

6. (3 marks)

The following three solutions are mixed together in a fourth container:



What pH results?

Solution: Mole Method

For Example:

$$\text{HCl} : 1.0 \text{ M} \times 0.040 \text{ L} = 0.040 \text{ mol}$$

$$\text{HBr} : 1.0 \text{ M} \times 0.060 \text{ L} = 0.060 \text{ mol}$$

$$\text{Total H}^+ = 0.100 \text{ mol}$$

$$\text{NaOH} = 0.50 \text{ M} \times 0.100 \text{ L} = 0.050 \text{ mol}$$

$$\text{Excess H}^+ = 0.100 \text{ mol} - 0.050 \text{ mol} = 0.050 \text{ mol}$$

$$[\text{H}^+] = \frac{0.050 \text{ mol}}{0.200 \text{ L}} = 0.25 \text{ M}$$

$$\text{pH} = 0.60$$

← 1½ marks

← ½ mark

← ½ mark

← ½ mark

1.

4. (3 marks)

Complete the following equilibrium, then predict whether the reactants or products will be favoured and explain why.



Solution:

For Example:



The equilibrium favours the reactants

since the $K_a \text{ H}_2\text{SO}_3 > K_a \text{ HSO}_4^-$

← 1 mark

← 1 mark

← 1 mark

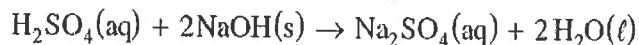
3.

6. What mass of NaOH(s) is required to just neutralize 50.0 mL of 2.0 M H₂SO₄?
Begin by writing the balanced equation for the neutralization reaction.

(3 marks)

Solution:

For Example:



← 1 mark

$$\begin{aligned} \text{Mass of NaOH} &= \frac{2.0 \text{ mol}}{\text{L}} \text{H}_2\text{SO}_4 \times 0.0500 \text{ L} \times \frac{2 \text{ mol NaOH}}{1 \text{ mol H}_2\text{SO}_4} \times \frac{40.0 \text{ g}}{\text{mol NaOH}} \\ &= 8.0 \text{ g} \end{aligned}$$

← 2 marks

4.

5. Water, at 60°C, has a $K_w = 9.55 \times 10^{-14}$.

- a) Write an equation representing the ionization of water. Include the heat of reaction (57.1 kJ) in the equation.

(2 marks)

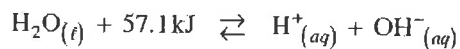
Solution:

For Example:



← 2 marks

OR



Note: Endothermic can be deduced from the data provided.
1 mark for the equation.
1 mark for determining endothermic.

- b) If a small amount of NaOH is added to water, what happens to the value of K_w ?

(1 mark)

Solution:

For Example:

K_w remains unchanged.

← 1 mark