

A/B II Written Response Key:

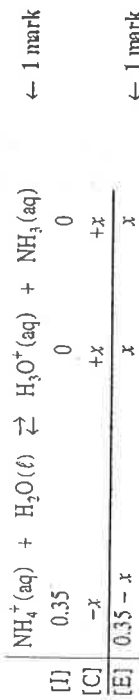
2.

5. (5 marks)

Calculate the pH of a 0.35 M solution of the salt ammonium bromide. Begin by writing the equation for the predominant equilibrium.

Solution:

For Example:



← 1 mark

← 1 mark

(assume x is negligible)

$$K_a = \frac{[\text{H}_3\text{O}^+][\text{NH}_3]}{[\text{NH}_4^+]}$$

$$5.6 \times 10^{-10} = \frac{x^2}{0.35}$$

← 1 mark

$$x = [\text{H}_3\text{O}^+] = 1.4 \times 10^{-5} \text{ M}$$

← 1 mark

← 1 mark

$$\text{pH} = 4.85$$

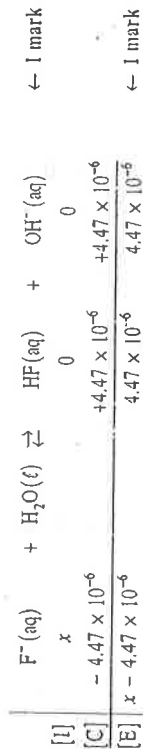
1.

5. (5 marks)

Calculate the initial concentration of a KF salt solution that has a pH = 8.65. Begin by writing the equation for the predominant equilibrium reaction.

Solution:

For Example:



← 1 mark

← 1 mark

↑

$$\boxed{\begin{matrix} \text{pOH} = 5.35 \\ \text{pH} = 8.65 \end{matrix}}$$

(it may be assumed that 4.47 × 10⁻⁶ is negligible)

← 1 mark

$$K_b = \frac{K_w}{K_a} = \frac{1.0 \times 10^{-14}}{3.5 \times 10^{-4}} = 2.86 \times 10^{-11}$$

$$K_b = \frac{[\text{HF}][\text{OH}^-]}{[\text{F}^-]}$$

$$2.86 \times 10^{-11} = \frac{(4.47 \times 10^{-6})(4.47 \times 10^{-6})}{x}$$

← 1 mark

← 1 mark

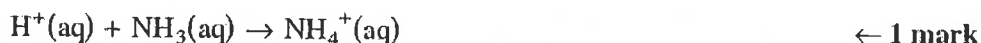
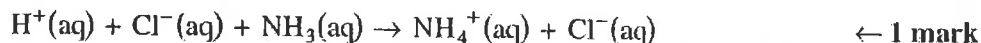
$$x = 0.70 \text{ M} = [\text{F}^-] = [\text{KF}]$$

3.

6. A sample of the strong acid $\text{HCl}(\text{aq})$ is titrated with a sample of $\text{NH}_3(\text{aq})$, a weak base. Write the formula, complete ionic and net ionic equations for the titration reaction. (3 marks)

Solution:

For Example:



4.

4. Describe **two** lab tests and how their outcomes could be used to distinguish between a strong acid and a weak acid of equal molar concentrations. (4 marks)

Solution:

For Example:

(Any two of the following for 4 marks.)

Test: Electrical conductivity

Outcome: Strong acid has a greater conductivity than the weak acid.

Test: Reaction with Mg

Outcome: Strong acid has a greater reaction rate than the weak acid.

Test: Compare pH using a pH metre

Outcome: Strong acid has a lower pH than the weak acid.