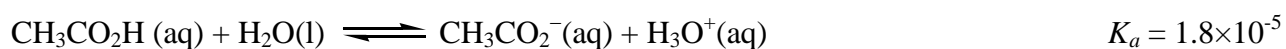
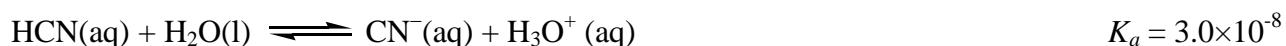
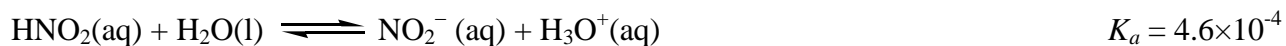


ANSWERS ARE TO BE WRITTEN ON THIS PAPER IN THE SPACES PROVIDED

Note: Please check the Data Sheet on page 18 of this exam paper for information required to answer questions.

QUESTION 1*[2 marks]*

Several acids are listed here with their respective equilibrium constants.



Which acid is the strongest?

Which acid has the strongest conjugate base?

QUESTION 2*[2 marks]*

An aqueous solution has a **hydronium ion**, H_3O^+ , concentration of $1.5 \times 10^{-8} \text{ M}$ at 25°C .

- (a) What is the **pH** of the solution?
- (b) Is the solution acidic or basic?

(a)
(b)

QUESTION 3*[2 marks]*

Dissolving sodium nitrite (NaNO_2) in water gives a basic solution. Write a balanced chemical equation showing how the nitrite ion is responsible for this effect.

QUESTION 4*[4 marks]*

Calculate the pH of a 0.05 M aqueous solution of formic acid, HCOOH . The K_a for formic acid is 1.8×10^{-4} .

QUESTION 5*[3 marks]*

What is the pH of a formic acid (HCO_2H)/sodium formate (NaHCO_2) buffer solution if $[\text{HCO}_2\text{H}] = 0.50 \text{ M}$ and $[\text{HCO}_2^-] = 0.70 \text{ M}$? The $\text{p}K_a$ for formic acid is 3.74.

QUESTION 6*[4 marks]*

The solubility product, K_{sp} , for silver chromate, Ag_2CrO_4 , is 2.6×10^{-12} at 25°C .

- (i) Write an expression for K_{sp} in terms of the concentration of Ag^+ and CrO_4^{2-} ions present in solution.

- (ii) What is the maximum amount of Ag_2CrO_4 that can be dissolved in pure water at 25°C , in mol L^{-1} ?

NUMERICAL DATA

Ionisation constant for water at 25°C: $K_w = 1.01 \times 10^{-14}$

Gas constant: $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$

Faraday constant: $F = 96485.34 \text{ C mol}^{-1}$

1 H Hydrogen 1.007 94		Periodic Table of the Elements																		Group 18	
																				2 He Helium 4.002 60	