

# Chemistry 225 Semester 01-2012

## Homework for Submission #4

Answer the following question and submit it for marking on or before 2 pm on Thursday 15<sup>th</sup> March in the chemistry drop box. Only answers showing full working can attract full marks. Express numerical answers to the correct number of significant figures. If any answer shows evidence of copying the whole exercise will attract zero marks. Construct your answers carefully before submitting them on separate sheets of lined paper. **Use only one side of the paper.**

- 1) Define the terms *acid* and *base* according to the Brønsted-Lowry theory.
- 2) The ammonium ion ( $\text{NH}_4^+$ ) is a weak Brønsted-Lowry acid in water.
  - a) Write the equation for the acid dissociation of this ion in water. Label the conjugate base of this acid in the equation.
  - b) The acid dissociation constant for this ion is  $9.6 \times 10^{-10}$  at 25°C. Calculate the pH of a solution which is made up by dissolving 0.10 mol of ammonium chloride,  $\text{NH}_4^+\text{Cl}^-$ , in water to make 2.0 dm<sup>3</sup> of solution. (NB. The chloride ion has no appreciable acidic or basic properties and need not be considered.)
- 3) The nitrite ion ( $\text{NO}_2^-$ ) is a weak base in water. The base dissociation constant for this ion in water is  $6.31 \times 10^{-10}$  at 25°C.
  - a) Write the equation for the base dissociation of this ion in water. **Label the conjugate acid of this base in the equation.**
  - b) Calculate the pH of a solution which is 0.035 M in sodium nitrite,  $\text{Na}^+\text{NO}_2^-$ , at 25°C. (NB. The sodium ion has no appreciable acidic or basic properties and need not be considered.)