

Assignment Five

Acid-Base Theory, Conjugate Acid-Base Pairs, Amphoterism and Net Ionic Equations

- Identify each of the following species as either an Arrhenius Acid (AA), Arrhenius Base (AB), Bronsted Acid (BA), or Bronsted Base(BB). It is possible for a chemical species to be any one of or a combination of all four. Assume all species are in their aqueous form. (15 marks in total)
 - H_2CO_3
 - HS^-
 - HPO_4^{2-}
 - NH_3
 - HPh
 - H_2O
- Given the following reactants, identify the Bronsted-Lowry conjugate acid-base pairs. Write the acid-base system for each. (15 marks @ 3 each)
 - $\text{HPO}_4^{2-}(\text{aq}) + \text{F}^-(\text{aq})$
 - $\text{HCOOH}(\text{aq}) + \text{HBO}_3^{2-}(\text{aq})$
 - $\text{HNO}_2(\text{aq}) + \text{S}^{2-}(\text{aq})$
 - $\text{HOCCOO}^-(\text{aq}) + \text{NH}_3(\text{aq})$
 - $\text{H}_2\text{SO}_3(\text{aq}) + \text{H}_2\text{O}(\text{aq})$
- Write the net ionic B-L A-B system equations for the following reactions. All species are aqueous. (15 marks @ 3 each)
 - magnesium sulfate and the hydrogen carbonate ion
 - aluminum carbonate and acetic acid
 - calcium sulfite and the hydrogen oxalate ion
 - hydroiodic acid and magnesium carbonate
 - nitric acid and sodium thiocyanate
- Demonstrate, using chemical equations, the amphoteric nature of the following species: (4 marks @ 2 each)
 - water
 - hydrogen phosphate ion
- Which of the following species are amphoteric? Simply answer Y or N (6 marks)
 - oxalic acid
 - sulfurous acid
 - phosphide ion
 - bromide ion
 - dihydrogen borate ion
 - methanoate ion

