**Brønsted-Lowry review questions:**

1. Which of the following reactions are regarded as Brønsted-Lowry acid-base reactions?   
   For these reactions identify which reactant is acting as the Brønsted-Lowry acid and which is acting as the Brønsted-Lowry base.  
   1. SO32-(aq) + H2O(ℓ) ⇌ HSO3-(aq) + OH-(aq)  
       **Base Acid**
   2. HS-(aq) + NH3(aq) 🡪 NH4+(aq) + S2-(aq)  
       **Acid Base**
   3. H2O2(aq) + H2O2(aq) 🡪 2 H2O(ℓ) + O2(g) **Not Bronsted-Lowry**
   4. H2O(ℓ) + H2O(ℓ) ⇌ H3O+(aq) + OH-(aq)

**[You can put them either way around. One water molecule is acid, the other water molecule is base]**

1. Write equations for the dihydrogenphosphate ion reacting with water as a:  
   1. Brønsted-Lowry acid

**H2PO4-(aq) + H2O(ℓ) ⇌ HPO42-(aq) + H3O+(aq)**

* 1. Brønsted-Lowry base

**H2PO4-(aq) + H2O(ℓ) ⇌ H3PO4(aq) + OH-(aq)**

1. The hydrogensulfide ion, HS-, is amphiprotic.
   1. What is meant be the word ‘amphiprotic’? **Can accept or donate protons**
   2. When HS- is added to hydrochloric acid, it acts as a Brønsted-Lowry base. Write the equation for the reaction between HS-(aq) and the hydronium ions in the hydrochloric acid.

**HS-(aq) + H3O+(aq) ⇌ H2S(aq) + H2O(ℓ)**

* 1. HS- acts as a Brønsted-Lowry base when it is added to a solution of sodium hydroxide. Write an equation for the reaction between HS-(aq) and the hydroxide ions in the sodium hydroxide solution

**HS-(aq) + OH-(aq) ⇌ S2-(aq) + H2O(ℓ)**

1. Complete the tables by giving the formula of the conjugate acids/bases.

|  |  |
| --- | --- |
| **Acid** | **Conjugate base** |
| HI | **I-** |
| HNO2 | **NO2-** |
| HCO3- | **CO32-** |
| PH4+ | **PH­3** |

|  |  |
| --- | --- |
| **Base** | **Conjugate acid** |
| SO32- | **HSO3-** |
| O2- | **OH-** |
| HF | **H2F+** |
| NH3 | **NH4+** |

1. Draw lines linking the conjugate acid-base pairs in the following reactions. Label each species as being an acid or a base.

Acid Base

HCN(g) + OH-(aq) ⇌ CN-(aq) + H2O(ℓ)

Base Acid

Base Acid

H2SO4(ℓ) + HNO3(ℓ) ⇌ H­3SO4+(ℓ) + NO3-(ℓ)

Acid Base