CHEMISTRY 12 –BRÖNSTED-LOWRY ACIDS & BASES WORKSHEET

1) Define Brönsted-Lowry acid. **(1 mark)**

2) Define Brönsted-Lowry base. **(1 mark)**

3) Write balanced equations showing the reaction of the following weak acids with water: **(8 marks)**

   (a) $H_2C_6H_6O_6$

   (b) C_6H_5OH

   (c) CH_3COOH

   (d) HCO_3^-

   (e) H_3BO_3

   (f) HPO_4^{2-}

   (g) NH_4^+

   (h) H_2O_2

4) Write balanced equations showing the reaction of the following weak bases with water: **(8 marks)**

   (a) F^-

   (b) HPO_4^{2-}

   (c) CH_3NH_2

   (d) NH_3

   (e) $HC_6H_5O_7^{2-}$

   (f) CN^-

   (g) N_2H_4

   (h) $C_2O_4^{2-}$

5) Identify the conjugate acid of the following: **(4 marks)**

   (a) PO_4^{3-}

   (b) $H_2BO_3^-$

   (c) $HAsO_4^{2-}$

   (d) H_2O

6) Identify the conjugate base of the following: **(4 marks)**

   (a) HCN

   (b) $H_2C_5H_5O_7^-$

   (c) $H_2PO_4^-$

   (d) H_2O

7) Circle the Brönsted-Lowry acids in the following equilibria: **(4 marks)**

   (a) $HS^- + H_3BO_3 \rightleftarrows H_2BO_3^- + H_2S$

   (b) $C_6H_5NH_2 + H_2O \rightleftarrows C_6H_5NH_3^+ + OH^-$

   (c) $HC_2O_4^- + HSO_4^- \rightleftarrows H_2C_2O_4 + SO_4^{2-}$

   (d) $NO_2^- + H_2SO_3 \rightleftarrows HSO_3^- + HNO_2$

8) Circle the Brönsted-Lowry bases in the following equilibria: **(4 marks)**

   (a) $HSO_3^- + H_2PO_4^- \rightleftarrows SO_3^{2-} + H_3PO_4$

   (b) $HC_2O_4^- + H_2BO_3^- \rightleftarrows H_3BO_3 + C_2O_4^{2-}$

   (c) $H_2PO_4^- + HCO_3^- \rightleftarrows HPO_4^{2-} + H_2CO_3$

   (d) $HCO_3^- + H_2O \rightleftarrows H_2CO_3 + OH^-$

9) (a) Write the Brönsted-Lowry acid-base equation for the reaction between HCN and NH_3. **(1 mark)**

(b) Write a conjugate acid-base pair from the equation above. **(1 mark)**

10) (a) Write the Brönsted-Lowry acid-base equation for the reaction between HNO_2 and $C_2O_4^{2-}$. **(1 mark)**

(b) Write a conjugate acid-base pair from the equation above. **(1 mark)**

11) (a) Write the balanced equation representing the reaction of H_2S with H_2O. **(1 mark)**

(b) Identify the Brönsted-Lowry acids in the above equation. **(1 mark)**

12) (a) Write the balanced equation representing the reaction of IO_3^- with H_2O. **(1 mark)**

(b) Identify the Brönsted-Lowry bases in the above equation. **(1 mark)**

13) (a) Write the acid-base equation for the reaction between H_3BO_3 and HSO_3^-. **(1 mark)**

(b) Write a conjugate acid-base pair from the equation above. **(1 mark)**

14) In an acid-base reaction, the two Brönsted-Lowry acids are hydrofluoric acid (HF) and the hydrogen sulphite ion (HSO_3^-). Write the equation for this reaction. **(2 marks)**

15) In an acid-base reaction, the two Brönsted-Lowry bases are $HC_2O_4^-$ and $H_2BO_3^-$. Write the equation for this reaction. **(2 marks)**