4. As well as the lack of evidence to support the formation of NH_4OH as a intermediate in the case of NH_3 acting as a base contributes to the flaws. (3)

5. A Brønstead - Lowry acid is considered a proton (H^+) doner in which reacts with a base. (2)

A Brønstead - Lowry base is considered a proton (H^+) accepter in which reacts with an acid.

6. a) HSO_4^- ⟶ conjugate base = SO_4^{2-}
b) CH_3CH_2COOH ⟶ conjugate base = CH_3CHCOO^- (2)

7. a) NO_2^- ⟶ conjugate acid = HNO_2
b) $H_2PO_4^-$ ⟶ conjugate acid = H_3PO_4 (2)

8. Water is considered as an "amphoteric" compound because it can react as both an acid or a base: (3)

$$\overset{A}{HSO_4^-} + \overset{B}{H_2O_{(l)}} \rightleftharpoons \overset{C.B}{SO_4^{2-}{}_{(aq)}} + \overset{C.A}{H_3O^+{}_{(aq)}}$$

$$\underset{A}{H_2O_{(l)}} + \underset{B}{NO_2^-{}_{(aq)}} \rightleftharpoons \underset{C.B}{OH^-{}_{(aq)}} + \underset{C.A}{HNO_2{}_{(aq)}}$$

9. a) $N_2H_4{}_{(aq)} + H_2O_{(l)} \rightleftharpoons N_2H_5^+{}_{(aq)} + OH^-{}_{(aq)}$
base acid conj. acid conj. base

b) $CH_3COOH_{(aq)} + SO_4^{2-}{}_{(aq)} \rightleftharpoons CH_3COO^-{}_{(aq)} + HSO_4^-{}_{(aq)}$
acid base conj. base conj. acid. (4)