

Conjugate Acid Base Pairs

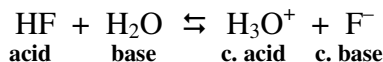
Chem Worksheet 19-2

Name _____

An **acid** is defined as a proton (H^+) donor while a **base** is a proton acceptor. The substance that is produced after an acid has donated its proton is called the **conjugate base** while the substance formed when a base accepts a proton is called the **conjugate acid**. The conjugate acid can donate a proton to the conjugate base, to reform the original reactants in the reverse reaction.

Acids donate protons
Bases accept protons

A proton is a hydrogen ion

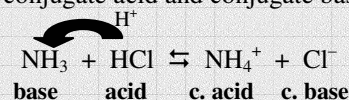


In the reaction above HF is the acid and H_2O is the base. The HF has given a proton to the H_2O , forming H_3O^+ and F^- . Since the product H_3O^+ can donate a proton back to F^- it is labeled the conjugate acid, while the F^- is the conjugate base.

Example

Write an equation that shows NH_3 reacting with HCl. Label the acid, base, and conjugate acid and conjugate base.

- Write reactants and transfer a proton from the acid to the base:



Rewrite each equation. Identify the acid, the base, the conjugate acid, and the conjugate base in each of the equations.

1. $HCl + NH_3 \rightarrow NH_4^+ + Cl^-$
2. $OH^- + HCN \rightarrow H_2O + CN^-$
3. $PO_4^{3-} + HNO_3 \rightarrow NO_3^- + HPO_4^{2-}$
4. $HCO_3^- + HCl \rightarrow H_2CO_3 + Cl^-$
5. $HCO_3^- + OH^- \rightarrow H_2O + CO_3^{2-}$
6. $NH_4^+ + H_2O \rightarrow NH_3 + H_3O^+$
7. $C_2O_4^{2-} + HC_2H_3O_2 \rightarrow HC_2O_4^- + C_2H_3O_2^-$
8. $HPO_4^{2-} + H_2O \rightarrow OH^- + H_2PO_4^-$

Fill in the following table.

	Acid	Base	Conjugate Acid	Conjugate Base	Equation
9	HNO_2	H_2O			$HNO_2 + H_2O \rightarrow NO_2^- + H_3O^+$
10	H_2O	F^-	HF	OH^-	
11					$NH_3 + HCN \rightarrow NH_4^+ + CN^-$
12			H_2O	ClO_3^-	
13	HSO_4^-	PO_4^{3-}			
14					$S^{2-} + H_2O \rightarrow OH^- + HS^-$
15	HCO_2H	OH^-			

16. Write an equation that shows the reaction of ammonia, NH_3 with hydrobromic acid, HBr. Label the acid, the base, the conjugate acid, and the conjugate base.
17. Write an equation that shows the reaction of phosphate ion, PO_4^{3-} , reacting with hydronium ion, H_3O^+ . Label the acid, the base, the conjugate acid, and the conjugate base.
18. Write an equation that shows the reaction of hydrogen sulfide, HS^- with hydroxide ion, OH^- . Label the acid, the base, the conjugate acid, and the conjugate base.