

Acid Base Properties of Salts

Type of Salt	Examples	Comment	pH of Solution
Cation is from a strong base, anion from a weak acid	NaC ₂ H ₃ O ₂ KCN, NaF	Cation is neutral, Anion is basic	Basic
The basic anion can accept a proton from water:			
C ₂ H ₃ O ₂ ⁻ + <i>Base</i>	H ₂ O <i>acid</i>	⇌	HC ₂ H ₃ O ₂ + <i>acid</i>
			OH ⁻ <i>base</i>
Cation is the conjugate acid of a weak base, anion is from a strong acid	NH ₄ Cl, NH ₄ NO ₃	Cation is acidic, Anion is neutral	Acidic
The acidic cation can act as a proton donor:			
NH ₄ ⁺ (aq) <i>Acid</i>	⇌	NH ₃ (aq) + <i>Conjugate base</i>	H ⁺ (aq) <i>Proton</i>
Cation is the conjugate acid of a weak base, anion is conjugate base of a weak acid	NH ₄ C ₂ H ₃ O ₂ NH ₄ CN	Cation is acidic, Anion is basic	See below
<ul style="list-style-type: none"> ▷ IF <i>K_a</i> for the acidic ion is greater than <i>K_b</i> for the basic ion, the solution is acidic ▷ IF <i>K_b</i> for the basic ion is greater than <i>K_a</i> for the acidic ion, the solution is basic ▷ IF <i>K_b</i> for the basic ion is equal to <i>K_a</i> for the acidic ion, the solution is neutral 			
Cation is a highly charged metal ion; Anion is from strong acid	Al(NO ₃) ₃ FeCl ₃	Hydrated cation acts as an acid; Anion is neutral	Acidic
Step #1:			
AlCl ₃ (s) + <i>Salt</i>	6H ₂ O <i>Water</i>	→	Al(H ₂ O) ₆ ³⁺ (aq) <i>Complex Ion</i>
			+ Cl ⁻ (aq) <i>Anion</i>
Step #2:			
Al(H ₂ O) ₆ ³⁺ (aq) <i>Acid</i>	→	Al(OH)(H ₂ O) ₅ ²⁺ (aq) <i>Conjugate Base</i>	+ H ⁺ (aq) <i>Proton</i>

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			OH ⁻ <i>base</i>
Cation is the conjugate acid of a weak base, anion is from a strong acid	NH ₄ Cl, NH ₄ NO ₃	Cation is acidic, Anion is neutral	Acidic
The acidic cation can act as a proton donor:			
NH ₄ ⁺ (aq) <i>Acid</i>	⇌	NH ₃ (aq) + <i>Conjugate base</i>	H ⁺ (aq) <i>Proton</i>
Cation is the conjugate acid of a weak base, anion is conjugate base of a weak acid	NH ₄ C ₂ H ₃ O ₂ NH ₄ CN	Cation is acidic, Anion is basic	See below
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Cation is a highly charged metal ion; Anion is from strong acid	Al(NO ₃) ₃ FeCl ₃	Hydrated cation acts as an acid; Anion is neutral	Acidic
Step #1:			
AlCl ₃ (s) + <i>Salt</i>	6H ₂ O <i>Water</i>	→	Al(H ₂ O) ₆ ³⁺ (aq) <i>Complex Ion</i>
			+ Cl ⁻ (aq) <i>Anion</i>
Step #2:			
Al(H ₂ O) ₆ ³⁺ (aq) <i>Acid</i>	→	Al(OH)(H ₂ O) ₅ ²⁺ (aq) <i>Conjugate Base</i>	+ H ⁺ (aq) <i>Proton</i>