

**Use whichever helps you most; they are your friends ;)**

## Simple Rules for the Solubility of Salts in Water

1. Most Nitrate ( $\text{NO}_3^-$ ) salts are soluble.
2. Most salts containing the alkali metal ions ( $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cs}^+$ ,  $\text{Rb}^+$ ) and the ammonium ion ( $\text{NH}_4^+$ ) are soluble
3. Most chloride, bromide, and iodide salts are soluble. Notable exceptions are salts containing the ions  $\text{Ag}^+$ ,  $\text{Pb}^+$ , and  $\text{Hg}_2^{2+}$ .
4. Most sulfate salts are soluble. Notable exceptions are  $\text{BaSO}_4$ ,  $\text{PbSO}_4$ , and  $\text{CaSO}_4$ .
5. Most hydroxide salts are only slightly soluble. The important soluble hydroxides are  $\text{NaOH}$ , and  $\text{KOH}$ . The compounds  $\text{Ba}(\text{OH})_2$ ,  $\text{Sr}(\text{OH})_2$ , and  $\text{Ca}(\text{OH})_2$  are marginally soluble.
6. Most sulfide ( $\text{S}^{2-}$ ), carbonate ( $\text{CO}_3^{2-}$ ), chromate ( $\text{CrO}_4^{2-}$ ), and phosphate ( $\text{PO}_4^{3-}$ ) salts are only slightly soluble.

The terms insoluble and slightly soluble really mean the same thing: such a tiny amount dissolves that is not possible to detect it with the naked eye.

## Table for the Solubility of Salts in Water

Negative Ion	Plus	Positive Ion	Forms a Compound Which is
Any negative ion	+	Alkali metal ions	<b>Soluble</b>
Any negative ion	+	Ammonium ion	<b>Soluble</b>
Nitrate ( $\text{NO}_3^-$ )	+	Any positive ion	<b>Soluble</b>
Acetate ( $\text{CH}_3\text{COO}^-$ )	+	Any positive ion <i>except</i> $\text{Ag}^+$ or $\text{Hg}_2^{2+}$	<b>Soluble</b>
Chloride ( $\text{Cl}^-$ ), Bromide ( $\text{Br}^-$ ), or Iodide ( $\text{I}^-$ )	+	$\text{Ag}^+$ , $\text{Pb}^{2+}$ , $\text{Hg}_2^{2+}$ , or $\text{Cu}^+$	<b>Not Soluble</b>
	+	Any other positive ion	<b>Soluble</b>
Sulfate ( $\text{SO}_4^{2-}$ )	+	$\text{Ca}^{2+}$ , $\text{Sr}^{2+}$ , $\text{Ba}^{2+}$ , $\text{Ra}^{2+}$ , $\text{Ag}^+$ or $\text{Pb}^{2+}$	<b>Not Soluble</b>
	+	Any other positive ion	<b>Soluble</b>
Sulfide ( $\text{S}^{2-}$ )	+	Alkali ions or Ammonium ion	<b>Soluble</b>
	+	$\text{Be}^{2+}$ , $\text{Mg}^{2+}$ , $\text{Ca}^{2+}$ , $\text{Sr}^{2+}$ , $\text{Ba}^{2+}$ , or $\text{Ra}^{2+}$	<b>Soluble</b>
	+	Any other positive ion	<b>Not Soluble</b>
Hydroxide ( $\text{OH}^-$ )	+	Alkali ions or Ammonium ion	<b>Soluble</b>
	+	Any other positive ion	<b>Not Soluble</b>
Phosphate ( $\text{PO}_4^{3-}$ ), Carbonate ( $\text{CO}_3^{2-}$ ) or Sulfite ( $\text{SO}_3^{2-}$ )	+	Alkali ions or Ammonium ion	<b>Soluble</b>
	+	Any other positive ion	<b>Not Soluble</b>

## Another Table for the Solubility of Salts in Water

### (a) Soluble compounds

$\text{NO}_3^-$ salts
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$\text{Na}^+, \text{K}^+, \text{NH}_4^+$ salts
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$\text{Cl}^-, \text{Br}^-, \text{I}^-$ salts
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Except for those containing	$\text{Ag}^+, \text{Hg}_2^{2+}, \text{Pb}^{2+}$
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$\text{SO}_4^{2-}$ salts
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Except for those containing	$\text{Ba}^{2+}, \text{Pb}^{2+}, \text{Ca}^{2+}$
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### (b) Insoluble compounds

$\text{S}^{2-}, \text{CO}_3^{2-}, \text{PO}_4^{3-}$ salts
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$\text{OH}^-$ salts
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Except for those containing	$\text{Na}^+, \text{K}^+, \text{Ca}^{2+}$
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