

# Solubility Rules Made Easy

## CASH N' GIA




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*Directions on following slides*

<b>All Soluble</b>		<b>Except With</b>
Chlorates		
Acetates		
Sulfate		<u>C<sub>a</sub>B<sub>a</sub>S<sub>r</sub>H<sub>g</sub>A<sub>g</sub>P<sub>b</sub></u> (CBS HAPpy)
Halogens		H <sub>g</sub> A <sub>g</sub> P <sub>b</sub> (HAPpy)
<u>Nitrates</u>		
Group IA		

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The acronym, “CASH N’ GIA” reminds you of substances in the first column that are soluble:

**C** ----- for Chlorates (  $\text{ClO}_3^{-1}$  )

**A** ----- for Acetates (  $\text{C}_2\text{H}_3\text{O}_2^{-1}$  )

**S** ----- for Sulfates (  $\text{SO}_4^{-2}$  )

**H** ----- for Halogens (  $\text{F}^{+1}$ ,  $\text{Cl}^{+1}$ ,  $\text{Br}^{+1}$ ,  $\text{I}^{+1}$ ,  $\text{At}^{+1}$  )

**N’**----- for Nitrates (  $\text{NO}_3^{-1}$  )

**GIA** --- for Group IA (  $\text{Li}^{+1}$ ,  $\text{Na}^{+1}$ ,  $\text{K}^{+1}$ ,  $\text{Rb}^{+1}$ ,  
 $\text{Cs}^{+1}$ ,  $\text{Fr}^{+1}$  )

All of these are soluble  
with the **exceptions**  
on the next slide

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Exceptions for solubility are in the second column, with the “CBS” and “HAPpy”:

**C** ----- for Calcium (Ca )

**B** ----- for Barium (Ba)

**S** ----- for Strontium (Sr )

**H** ----- for mercury ( $\text{Hg}^{+2}$  )

**A** ----- for silver ( $\text{Ag}^+$  )

**P** ----- for lead ( $\text{Pb}^{+2}$ )

All of these are insoluble with Sulfates

These 3 are insoluble with Halogens

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OR

Simple Solubility Rules, bullet points, just memorize:

- Nitrates ( $\text{NO}_3^{-1}$ ) salts are soluble
- Alkali (group IA salts and  $\text{NH}_4^+$ ) are soluble.
- $\text{Cl}^-$ ,  $\text{Br}^-$ , and  $\text{I}^-$  salts are soluble (NOT  $\text{Ag}^+$ ,  $\text{Pb}^{2+}$ ,  $\text{Hg}^{2+}$ )
- Sulfates salts are soluble (NOT  $\text{BaSO}_4$ ,  $\text{PbSO}_4$ ,  $\text{HgSO}_4$ ,  $\text{CaSO}_4$ )
- $\text{OH}^-$  salts are only slightly soluble (NaOH, KOH are soluble,  $\text{Ba}(\text{OH})_2$ ,  $\text{Ca}(\text{OH})_2$  are marginally soluble)
- $\text{S}^{2-}$ ,  $\text{CO}_3^{2-}$ ,  $\text{CrO}_4^{2-}$ ,  $\text{PO}_4^{3-}$  salts are insoluble

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(**Bolded substances** are not on CASH N' GIA)