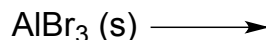


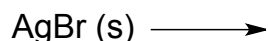
CONCEPT: SOLUBILITY RULES

- **Solubility:** A chemical property that deals with the ability of a solute to become dissolved in a solvent.

□ **Soluble:** Refers to a solute that can be dissolved into _____ when placed in a solvent.



□ **Insoluble:** Refers to a solute that cannot be dissolved when placed in a solvent.



EXAMPLE: How many ions will the following soluble compound produce: Na_2SO_4 ?

Solubility Rules

- The Solubility Rules are a convenient set of guidelines to help us determine if a compound will be *soluble* or *insoluble*.

MEMORY TOOL



" The bank robber was **GANNA CASH** his loot, but the **COPS** stopped him "



- **GANNA CASH** is used for **Soluble Ionic Solutes**, with the **exceptions** creating an insoluble solute called a _____.

□ **Exceptions:** "**SH**hhh! Keep quiet about the cash."

Soluble Compounds			
Group	Structures	Exceptions	Explanation
G _____	Li, Na, K	None	
A _____	$\text{C}_2\text{H}_3\text{O}_2^-$	None	
N _____	NO_3^-	None	
A _____	NH_4^+	None	
C _____	$\text{ClO}_3^- / \text{ClO}_4^-$	None	
A _____			
S _____	SO_4^{2-}	CBS HAPpy	□ Creates a solid when connected to: C __ , B __ , S __ , H __ , A __ , P __
H _____	F, Cl, Br, I	HAPpy	□ Creates a solid when connected to: H __ , A __ , P __

EXAMPLE: According to the solubility rules, which of the following ionic compounds will be insoluble?

a) NaNO_3

b) $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$

c) BaSO_4

d) $(\text{NH}_4)_2\text{CO}_3$

e) CoClO_4

CONCEPT: SOLUBILITY RULES

- **COPS** is used for **Insoluble Ionic Solutes**, with the **exceptions** creating a _____ ionic compound.

□ **Exceptions:** “Oh Snap! It’s the cops!”

Insoluble Compounds			
Group	Structures	Exceptions	Explanation
C _____	$\text{CO}_3^{2-} / \text{CrO}_4^{2-}$	None	
O _____ 	$\text{O}^{2-} / \text{OH}^-$	CBS	☐ Creates a soluble aqueous compound when connected to: C __ , B __ , S __
P _____	PO_4^{3-}	None	
S _____ 	S^{2-}	CBS	☐ Creates a soluble aqueous compound when connected to: C __ , B __ , S __

EXAMPLE: Based on the chart shown above, determine which of the following substances will be soluble in water.

- a) $\text{Al}(\text{OH})_3$ b) $\text{Zn}_3(\text{PO}_4)_2$ c) Ag_2CO_3 d) CaS e) MgCrO_4

PRACTICE: Based on your understanding of the solubility rules, which of the following ionic compounds will be insoluble?

- a) Zinc chloride b) Manganese (V) chlorate c) Lead (II) sulfate d) Gallium acetate

PRACTICE: Which pair of compounds is insoluble in water?

- a) PbSO_4 and $\text{Pb}_3(\text{PO}_4)_2$
b) Na_2S and CuS
c) $(\text{NH}_4)_2\text{SO}_4$ and AgI
d) AgNO_3 and KNO_3