

Polyatomic ions (Radicals)

2 or more non-metals which form a covalent bond, but also form a charge. Ex: PO_4^{3-} , ClO_3^- .
"ate" "ite"

Most radicals are -

Chemical formula	Name	Chemical formula	Name
NH_4^+	ammonium	OH^-	hydroxide
HCO_3^-	bicarbonate	NO_3^-	nitrate
CO_3^{2-}	carbonate	NO_2^-	nitrite
ClO_3^-	chlorate	PO_4^{3-}	phosphate
CrO_4^{2-}	chromate	SO_4^{2-}	sulphate
CH_3COO^-	acetate	SO_3^{2-}	sulphite

1- Bonding and naming metals with polyatomic ions and naming them.

- Bonding: x-over charges of metal and PI
- Naming: name 1st element, name PI

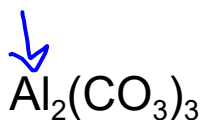
** Brackets around radical if more than 1*

example	x-over rule	name
Ca and CO_3^{2-}	$\text{Ca} \begin{matrix} 2 \\ \swarrow \end{matrix} \text{CO}_3 \begin{matrix} 2 \\ \searrow \end{matrix} = \text{CaCO}_3$	Calcium Carbonate
Ca and NO_3^-	$\text{Ca} \begin{matrix} 2 \\ \swarrow \end{matrix} \text{NO}_3 \begin{matrix} 1 \\ \searrow \end{matrix} = \text{Ca}(\text{NO}_3)_2$	Calcium Nitrate
Ca and PO_4^{3-}	$\text{Ca} \begin{matrix} 2 \\ \swarrow \end{matrix} \text{PO}_4 \begin{matrix} 3 \\ \searrow \end{matrix} = \text{Ca}_3(\text{PO}_4)_2$	Calcium Phosphate
Al and OH^-	$\text{Al} \begin{matrix} 3 \\ \swarrow \end{matrix} \text{OH} \begin{matrix} 1 \\ \searrow \end{matrix} = \text{Al}(\text{OH})_3$	Aluminum Hydroxide
Al and CO_3^{2-}	$\text{Al} \begin{matrix} 3 \\ \swarrow \end{matrix} \text{CO}_3 \begin{matrix} 2 \\ \searrow \end{matrix} = \text{Al}_2(\text{CO}_3)_3$	Aluminum Carbonate

Vocabulary:

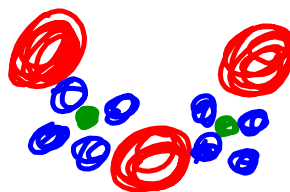
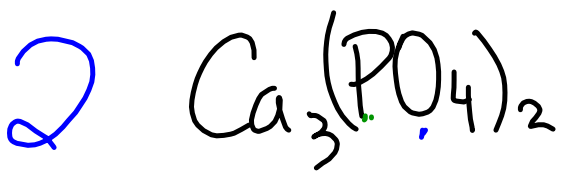
cation = metal

anion = radical

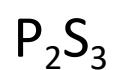


cation

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How to recognize a covalent bond vs a radical?



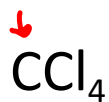
Covalent



Radical



Radical



Covalent



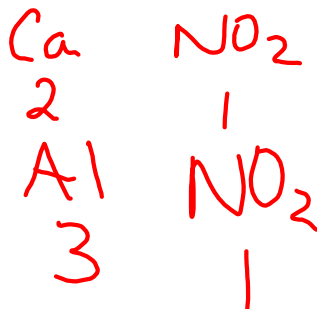
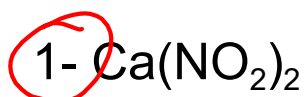
radical



covalent

Past Exam questions

1. The charge for nitrite is NO_2^- , choose the answer which shows correct bonds.



- A) 1 and 2 B) 1 and 3 C) 2 and 3
 D) 1, 2 and 3

2. The correct bonding of aluminum and chromate is $\text{Al}_2(\text{CrO}_4)_3$. What is the charge of chromate?

- A) -1 B) -2 C) -3 D) +1

3. Which of the following are examples of radicals?



- A) 2 and 4 C) 2, 3, 5 and 6
 B) 3, 5 and 6 D) 1, 3, 5 and 6