Ionic Compounds with Polyatomic Ions

Video Workbook with Dr. B

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Polyatomic ions are groups of non-metals bonded together to form an ion. You either memorize them, or if you instructor allows it, look them up on a table of polyatomic ions.

Memorize these immediately.

Ammonium ion: NH_4^+ Hydroxide ion: OH^- Nitrate ion: NO_3^-

Carbonate ion: CO_3^{2-} Sulfate ion: SO_4^{2-} Phosphate ion: PO_4^{3-}

Keys to Naming Ionic Compounds with Polyatomic Ions

- Name the metal (the cation) as it appears on the Periodic Table.

  Na = Sodium Al = Aluminum Fe = Iron

- Find the polyatomic ion on the list of polyatomic ions and write the name.
- If there is a transition metal, write the charge of the metal in parentheses. E.g. Iron (III) chloride.

Note: It is possible to have two polyatomic ions such as NH_4NO_3. In this case find and write both names as found on the Common Ion Table.

Example (video explanation): Na_2CO_3

- From the Periodic Table, Na is Sodium.
- Look up (or have memorized) that CO_3^{2-} is the Carbonate ion.
- The name for Na_2CO_3 is Sodium carbonate.

Example (video explanation): $Fe_3(PO_4)_2$

- From the Periodic Table, Fe is Iron.
- Look up (or have memorized) that PO_4^{3-} is the Phosphate ion.
- Determine the charge on the transition metal. For Iron it is 2+.
- The name for $Fe_3(PO_4)_2$ is Iron (II) phosphate.

Essential Video: How to Name Ionic Compounds with Polyatomic Ions

Practice with Video Explanations

Interactive practice naming ionic compounds with polyatomic ions.

This is one of the most effective ways to learn naming and formula writing.

Formula Writing for Ionic Compounds with Polyatomic Ions

We must consider the *ionic charge* on each element to write the formulas for ionic compounds.

Keys to Writing Formulas for Ionic Compounds with Polyatomic Ions:

- Write the element symbol for the metal and its charge using Periodic Table.
- Find the name and charge of the polyatomic ion on the Common Ion Table.
- See if the charges are balanced (if they are you're done!).
- Add subscripts (if necessary) so the charge for the entire compound is zero.
- Use the crisscross method to check your work.

Example (video explanation): Write the formula for Iron (III) phosphate

- From the Periodic Table, Iron is Fe.
- Look up (or have memorized) that PO_4^{3-} is the Phosphate ion.
- The charge for Iron (III) is 3+ .
- Since the 3+ and 3- cancel out, we're done.
- The formula of Iron (III) phosphate is $FePO_4$.

Example (video explanation): Write the formula for Copper (II) phosphate

- From the Periodic Table, Copper is Cu.
- Look up (or have memorized) that PO_4^{3-} is the Phosphate ion.
- The charge for Copper (II) is 2+ .
- Use the criss-cross method to balance the charge for the compound.
- The formula of Copper (II) phosphate is $Cu_3(PO_4)_2$.

Essential Video: How to Formula for Ionic Compounds with Polyatomic Ions

Practice with Video Explanations

Interactive practice for ionic compounds with polyatomic ions.

Report errors and suggestions to DrB@breslyn.org