Formulas of Ionic Compounds

A formula indicates the type(s) of atoms/ions and the number of atoms/ions that are bound together in a substance.

NaCl, FeF₃, Ca(NO₃)₃, H₂, C₆H₁₂O₆

In the formulas above, note that the subscripted numbers indicate how many of the preceding atoms/ions are present.

Ionic Compounds

Def.: Compounds made up of ions held together by the attraction between opposite charges.

- Opposite charges (+,-) attract.
- Like charges (+,+ or -,-) repel.

- When cations (positive ions) and anions (negative ions) combine to form a neutral compound, the total number of positives must equal the total number of negatives.

Writing Formulas for Ionic Compounds

Use charges to determine the smallest number of ions needed for neutral formula (the subscripts)

\[
\text{Total Number of } + = \text{Total Number of } - \\
\text{Criss-cross and Reduce if necessary}
\]

Write formula with cation first and anion second and any necessary subscripts. Charges are not written as part of the formula, since the compound is neutral.
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Examples (Criss-Cross)

Na\(^+\) Cl\(^-\)  
Al\(^{3+}\) S\(^2-\)  
NaCl  
Al\(_2\)S\(_3\)  
NH\(_4\)\(^+\) SO\(_3\)\(^2-\)  
(NH\(_4\))\(_2\)SO\(_3\)  
Fe\(^{3+}\) F\(^-\)  
FeF\(_3\)  

Sn\(^{4+}\) O\(^2-\)  
SnO\(_2\)  

Examples (Criss-Cross/Reduce)

Na\(^+\) Cl\(^-\)  
Al\(^{3+}\) S\(^2-\)  
NaCl  
Al\(_2\)S\(_3\)  
NH\(_4\)\(^+\) SO\(_3\)\(^2-\)  
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FeF\(_3\)  

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