

Determining Ionic Charges

Dr. Turner

| Response | Percentage |
|----------|------------|
| Yes | 75% |
| No | 25% |

* Lanthanide series

Actinide
series

| | | | | | | | | | | | | | | |
|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| 89 Ac (227) | 90 Th 232.04 | 91 Pa 231.04 | 92 U 238.03 | 93 Np (237) | 94 Pu (244) | 95 Am (243) | 96 Cm (247) | 97 Bk (247) | 98 Cf (251) | 99 Es (252) | 100 Fm (257) | 101 Md (258) | 102 No (259) | 103 Lr (262) |
|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|

Polyatomic ions to memorize

| Name of Ion | Symbol |
|-------------|---|
| Ammonium | NH_4^+ |
| Acetate | $\text{C}_2\text{H}_3\text{O}_2^-$ or CH_3COO^- |
| Cyanide | CN^- |
| Hydroxide | OH^- |
| Chlorate | ClO_3^- |
| Perchlorate | ClO_4^- |
| Nitrite | NO_2^- |
| Nitrate | NO_3^- |
| Sulfite | SO_3^{2-} |
| Sulfate | SO_4^{2-} |
| Carbonate | CO_3^{2-} |
| Phosphite | PO_3^{3-} |
| Phosphate | PO_4^{3-} |

- You need to know the name, symbol, and charge

Forming Neutral Ionic Compounds

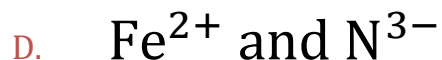
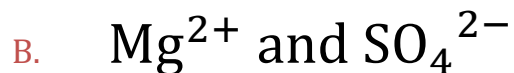
- All ionic compounds are electrically neutral, so the total positive charge of the cations must balance the total negative charge of the anions in the formula

Total positive charge = Total negative charge

For example, a compound of Sr^{2+} and CN^- will have the formula $\text{Sr}(\text{CN})_2$

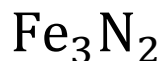
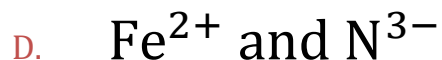
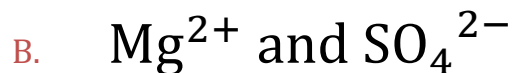
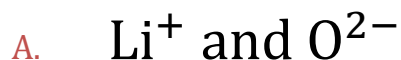
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Form neutral compounds from the following pairs.



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Forming Neutral Ionic Compounds

What is the formula for a compound made from Na^+ and O^{2-} ?

- A. NaO
- B. NaO_2
- C. Na_2O
- D. Na_2O_2
- E. NaO_3

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The correct answer is C

Solubility Rules (Memorize these!)

| Soluble Ions | Exceptions |
|---|---|
| $\text{Li}^+, \text{Na}^+, \text{K}^+, \text{Rb}^+, \text{Cs}^+, \text{NH}_4^+$ | None |
| $\text{C}_2\text{H}_3\text{O}_2^-, \text{NO}_3^-, \text{ClO}_3^-, \text{ClO}_4^-$ | None |
| $\text{Cl}^-, \text{Br}^-, \text{I}^-$ | $\text{Ag}^+, \text{Pb}^{2+}, \text{Hg}_2^{2+}$ |
| SO_4^{2-} | $\text{Ag}^+, \text{Pb}^{2+}, \text{Hg}_2^{2+}, \text{Ca}^{2+}, \text{Sr}^{2+}, \text{Ba}^{2+}$ |

Determining Solubility

- Soluble ions make compounds soluble unless they are paired with one of their exceptions
- If neither the cation nor ion in a compound are soluble, the compound is insoluble

Solubility and Dissociation

Identify whether the following compounds will or will not be soluble in water. If soluble, write the dissolved ion products

A. PbS

B. AgNO_3

C. CaI_2

D. NH_4Cl

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Identify whether the following compounds will or will not be soluble in water. If soluble, write the dissolved ion products

- A. PbS Insoluble
- B. AgNO₃ Soluble, Ag⁺ & NO₃⁻
- C. CaI₂ Soluble, Ca²⁺ & 2 I⁻
- D. NH₄Cl Soluble, NH₄⁺ & Cl⁻

Dissociation

What are the products of the dissociation of $\text{K}_2\text{SO}_4(\text{aq})$?

- A. $\text{K}(\text{aq}) + 2 \text{SO}_4(\text{aq})$
- B. $2 \text{K}(\text{aq}) + \text{SO}_4(\text{aq})$
- C. $2 \text{K}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$
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