

**TABLE 13.1** Solubility rules for common ionic compounds in water<sup>a</sup>**Mainly water soluble**

|                                    |   |
|------------------------------------|---|
| $\text{NO}_3^-$                    | All nitrates are soluble.   |
| $\text{C}_2\text{H}_3\text{O}_2^-$ | All acetates are soluble.   |
| $\text{ClO}_3^-$                   | All chlorates are soluble.  |
| $\text{Cl}^-$                      | All chlorides are soluble except $\text{AgCl}$ , $\text{Hg}_2\text{Cl}_2$ , and $\text{PbCl}_2$ .   |
| $\text{Br}^-$                      | All bromides are soluble except $\text{AgBr}$ , $\text{Hg}_2\text{Br}_2$ , $\text{PbBr}_2$ , and $\text{HgBr}_2$ .  |
| $\text{I}^-$                       | All iodides are soluble except $\text{AgI}$ , $\text{Hg}_2\text{I}_2$ , $\text{PbI}_2$ , and $\text{HgI}_2$ .   |
| $\text{SO}_4^{2-}$                 | All sulfates are soluble except $\text{CaSO}_4$ , $\text{SrSO}_4$ , $\text{BaSO}_4$ , $\text{PbSO}_4$ , $\text{Hg}_2\text{SO}_4$ , and $\text{Ag}_2\text{SO}_4$ . |

**Mainly water insoluble**

|                    |  |
|--------------------|--|
| $\text{S}^{2-}$    | All sulfides are insoluble except those of the 1A and 2A elements and $(\text{NH}_4)_2\text{S}$ .  |
| $\text{CO}_3^{2-}$ | All carbonates are insoluble except those of the 1A elements and $(\text{NH}_4)_2\text{CO}_3$ .  |
| $\text{SO}_3^{2-}$ | All sulfites are insoluble except those of the 1A elements and $(\text{NH}_4)_2\text{SO}_3$ .  |
| $\text{PO}_4^{3-}$ | All phosphates are insoluble except those of the 1A elements and $(\text{NH}_4)_3\text{PO}_4$ .  |
| $\text{OH}^-$      | All hydroxides are insoluble except those of the 1A elements, $\text{Ba}(\text{OH})_2$ , $\text{Sr}(\text{OH})_2$ , and $\text{Ca}(\text{OH})_2$ . |

<sup>a</sup> The following cations are considered: those of the 1A and 2A families,  $\text{NH}_4^+$ ,  $\text{Ag}^+$ ,  $\text{Al}^{3+}$ ,  $\text{Cd}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Hg}_2^{2+}$ ,  $\text{Hg}^{2+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Sn}^{2+}$ , and  $\text{Zn}^{2+}$ .