**Solubility Rules – Formula Sheet:**

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| **Ion:** | **Solubility:** | **Exceptions:** |
| **Group 1A Cations:**$$Li^{+}, Na^{+}, K^{+}, Rb^{+}, Cs^{+}$$ | Soluble | $$I\rightarrow Li\_{3}PO\_{4}, KClO\_{4}$$$$SS\rightarrow LiF, Li\_{2}CO\_{3}, KIO\_{4}, RbClO\_{4}, CsClO\_{4}, CsIO\_{4}$$ |
| $$NH\_{4}^{+}, NO\_{3}^{-}, C\_{2}H\_{3}O\_{2}^{-}, ClO\_{3}^{-}$$ | Soluble | $$SS\rightarrow AgC\_{2}H\_{3}O\_{2}$$ |
| $$Cl^{-}, Br^{-}, I^{-}$$ | Soluble | $$I\rightarrow Ag^{+}, Hg\_{2}^{2+}, Hg^{2+}, Cu^{+}, PbI\_{2}$$$$SS\rightarrow PbCl\_{2}, PbBr\_{2}$$$$S\rightarrow HgCl\_{2}$$  |
| $$F^{-}$$ | Soluble | $$I\rightarrow Mg^{2+}, Ca^{2+}, Sr^{2+}, Pb^{2+}, Ba^{2+}$$$$SS\rightarrow Hg\_{2}^{2+}, Fe^{2+}, Li^{+}$$ |
| $$SO\_{4}^{2-}$$ | Soluble | $$I\rightarrow Sr^{2+}, Ba^{2+}, Pb^{2+}, Hg\_{2}^{2+}$$$$SS\rightarrow Ca^{2+}, Ag^{+}$$ |
| $$OH^{-}$$ | Insoluble | $$S\rightarrow Li^{+}, Na^{+}, K^{+}, NH\_{4}^{+}, Sr^{2+}, Ba^{2+}$$$$SS\rightarrow Ca^{2+}$$ |
| $$S^{2-}$$ | Insoluble | $$S\rightarrow Li^{+}, Na^{+}, K^{+}, NH\_{4}^{+}, Sr^{2+}$$$$SS\rightarrow Ca^{2+}$$$$D\rightarrow Mg^{2+}, Ba^{2+}$$ |
| $$CO\_{3}^{2-} and PO\_{4}^{3-}$$ | Insoluble | $$S\rightarrow Li^{+}, Na^{+}, K^{+}, NH\_{4}^{+}$$$$SS\rightarrow MgCO\_{3}$$ |
| $$CrO\_{4}^{2-}$$ | Insoluble | $$S\rightarrow Li^{+}, Na^{+}, K^{+}, NH\_{4}^{+}, Mg^{2+}, Ca^{2+}$$$$SS\rightarrow Sr^{2+}$$ |
| $$I\rightarrow Insoluble S\rightarrow Soluble SS\rightarrow Slightly Soluble D\rightarrow Decomposes in Water$$ |

**Solubility Product Constants at** $25 ℃$

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| --- | --- | --- | --- | --- | --- | --- |
| **Formula:** | **Solubility:** | **KSP:** |  | **Formula:** | **Solubility:** | **KSP:** |
| $$Li\_{3}PO\_{4}$$ | $$I$$ | $$2.37×10^{-11}$$ |  | $$MgF\_{2}$$ | $$I$$ | $$5.16×10^{-11}$$ |
| $$LiF$$ | $$SS$$ | $$1.84×10^{-3}$$ |  | $$CaF\_{2}$$ | $$I$$ | $$3.45×10^{-11}$$ |
| $$Li\_{2}CO\_{3}$$ | $$SS$$ | $$8.15×10^{-4}$$ |  | $$SrF\_{2}$$ | $$I$$ | $$4.33×10^{-9}$$ |
| $$KClO\_{4}$$ | $$S$$ | $$1.05×10^{-2}$$ |  | $$BaF\_{2}$$ | $$I$$ | $$1.84×10^{-7}$$ |
| $$KIO\_{4}$$ | $$SS$$ | $$3.71 ×10^{-4}$$ |  | $$FeF\_{2}$$ | $$SS$$ | $$2.36×10^{-6}$$ |
| $$RbClO\_{4}$$ | $$SS$$ | $$3.0×10^{-3}$$ |  | $$Hg\_{2}F\_{2}$$ | $$SS$$ | $$3.10×10^{-6}$$ |
| $$CsClO\_{4}$$ | $$SS$$ | $$3.95×10^{-3}$$ |  | $$Ag\_{2}SO\_{4}$$ | $$SS$$ | $$1.20×10^{-5}$$ |
| $$CsIO\_{4}$$ | $$SS$$ | $$5.16×10^{-6}$$ |  | $$CaSO\_{4}$$ | $$SS$$ | $$4.93×10^{-5}$$ |
| $$AgC\_{2}H\_{3}O\_{2}$$ | $$SS$$ | $$1.94×10^{-3}$$ |  | $$SrSO\_{4}$$ | $$I$$ | $$3.44×10^{-7}$$ |
| $$AgCl$$ | $$I$$ | $$1.77×10^{-10}$$ |  | $$BaSO\_{4}$$ | $$I$$ | $$1.08×10^{-10}$$ |
| $$AgBr$$ | $$I$$ | $$5.35×10^{-13}$$ |  | $$PbSO\_{4}$$ | $$I$$ | $$2.53×10^{-8}$$ |
| $$AgI$$ | $$I$$ | $$8.52 ×10^{-17}$$ |  | $$Hg\_{2}SO\_{4}$$ | $$I$$ | $$6.5×10^{-7}$$ |
| $$Hg\_{2}Cl\_{2}$$ | $$I$$ | $$1.43×10^{-18}$$ |  | $$Mg(OH)\_{2}$$ | $$I$$ | $$5.61×10^{-12}$$ |
| $$Hg\_{2}Br\_{2}$$ | $$I$$ | $$6.4×10^{-23}$$ |  | $$Ca(OH)\_{2}$$ | $$SS$$ | $$5.02×10^{-6}$$ |
| $$Hg\_{2}I\_{2}$$ | $$I$$ | $$5.2×10^{-29}$$ |  | $$MgCO\_{3}∙3H\_{2}O$$ | $$SS$$ | $$2.38×10^{-6}$$ |
| $$HgBr\_{2}$$ | $$I$$ | $$6.2×10^{-20}$$ |  | $$MgCO\_{3}$$ | $$SS$$ | $$6.82 ×10^{-6}$$ |
| $$HgI\_{2}$$ | $$I$$ | $$2.9×10^{-29}$$ |  | $$CaCO\_{3}$$ | $$I$$ | $$3.36×10^{-9}$$ |
| $$CuCl$$ | $$I$$ | $$1.72×10^{-7}$$ |  | $$SrCO\_{3}$$ | $$I$$ | $$5.6×10^{-10}$$ |
| $$CuBr$$ | $$I$$ | $$6.27×10^{-9}$$ |  | $$BaCO\_{3}$$ | $$I$$ | $$2.58×10^{-9}$$ |
| $$CuI$$ | $$I$$ | $$1.27×10^{-12}$$ |  | $$PbCO\_{3}$$ | $$I$$ | $$7.4×10^{-14}$$ |
| $$PbF\_{2}$$ | $$I$$ | $$3.3×10^{-8}$$ |  | $$Co(IO\_{3})\_{2}∙2H\_{2}O$$ | $$S$$ | $$1.21×10^{-2}$$ |
| $$PbCl\_{2}$$ | $$SS$$ | $$1.7×10^{-5}$$ |  | $$Ca(IO\_{3})\_{2}$$ | $$SS$$ | $$6.47×10^{-6}$$ |
| $$PbBr\_{2}$$ | $$SS$$ | $$6.6×10^{-6}$$ |  | $$Ca(IO\_{3})\_{2}∙6H\_{2}O$$ | $$I$$ | $$7.1×10^{-7}$$ |
| $$PbI\_{2}$$ | $$I$$ | $$9.8×10^{-9}$$ |  | $$Sr(IO\_{3})\_{2}$$ | $$I$$ | $$1.14×10^{-7}$$ |
| $$Ba(BrO\_{3})\_{2}$$ | $$SS$$ | $$2.43×10^{-4}$$ |  | $$Ba(IO\_{3})\_{2}$$ | $$I$$ | $$4.01×10^{-9}$$ |
| $$AgBrO\_{3}$$ | $$SS$$ | $$5.38×10^{-5}$$ |  | $$AgIO\_{3}$$ | $$I$$ | $$3.17×10^{-8}$$ |