

Solubility of Ionic Compounds in Water

Cation Anion	Al 3+	NH ₄ 1+	Sb 3+	As 3+	Ba 2+	Bi 3+	Cd 2+	Ca 2+	Cr 3+	Co 2+	Cu 2+	Fe 3+	Fe 2+	H 1+	Pb 2+	Mg 2+	Hg 2+	Hg 1+	Ni 2+	K 1+	Ag 1+	Na 1+	Sr 2+	Zn 2+
Br ¹⁻	S	S	D	D	S	D	S	S	S	S	S	S	S	S	I	S	I	I _a	S	S	I _b	S	S	S
C ₂ H ₃ O ₂ ¹⁻	S	S	U	U	S	I	S	S	S	S	S	U	S	S	S	S	S	I	S	S	I	S	S	S
Cl ¹⁻	S	S	S	D	S	D	S	S	S	S	S	S	S	S	I	S	S	I _b	S	S	I _b	S	S	S
ClO ₃ ¹⁻	S	S	U	U	S	U	S	S	U	S	S	U	U	S	S	S	S	S	I	S	S	S	S	S
I ¹⁻	S	S	D	S	S	I	S	S	I	S	U	U	S	S	I _a	S	I _a	I _a	S	S	I	S	S	S
NO ₃ ¹⁻	S	S	U	U	S	D	S	S	S	S	S	S	S	S	S	S	S	D	S	S	S	S	S	S
OH ¹⁻	I _a	U	U	U	S	D	I	I _a	I	I	I _a	I _a	I _a	H ₂ O	I _a	I _a	U	U	I	S	U	S	I	I _a
CO ₃ ²⁻	U	S	U	U	I	U	I	I	U	I	I	U	I	S	I _a	I _a	I	I _a	I	S	I _a	S	I _a	I _a
C ₂ O ₄ ²⁻	I	I	I	U	I	D	I	I	S	I	I	S	I	S	I	I	I	I	I	S	I	S	I	I
CrO ₄ ²⁻	U	S	U	U	I _a	U	I	S	U	I	S	S	I	S	I _a	S	I _a	I _a	U	S	I _a	S	I _a	I _a
O ²⁻	I _b	U	I	I	S	I	I	I	I	I	I _a	I _a	I _a	H ₂ O	I	I _a	I	I _a	I	D	I	D	I	I
SiO ₃ ²⁻	I	U	U	U	S	I	I	I _a	U	I	U	U	I	I	I _a	I _a	U	U	U	S	U	S	I _a	I _a
S ²⁻	D	S	D	I	D	I	I	I _a	I	I	I _a	I	I _a	S	I _a	D	I	I	I	S	I _a	S	I	I _a
SO ₃ ²⁻	U	S	U	U	I	U	I	I	I	I	U	U	I	S	I	S	U	U	I	S	I	S	I	I
SO ₄ ²⁻	S	S	D	U	I _b	D	S	I _a	S	S	S	S	S	S	I	S	D	I	S	S	I	S	I	S
PO ₄ ³⁻	I _a	S	U	U	I _a	I	I	I _a	I	I	I _a	I _a	I _a	S	I _a	I _a	U	U	I	S	I _a	S	I _a	I _a

Key

S = Soluble	I = Insoluble	D = Decomposes in water	U = Compound does not exist or is unstable
I _a = Soluble in Acids	I _b = Slightly Soluble in Acids	H ₂ O = Produces water H ₂ O	

Rules for Solubility of Ionic Compounds in Water

Type of compound	Soluble	Insoluble/Slightly Soluble
Ammonium (NH ₄ ¹⁺) & Group IA metals (Li ⁺ , Na ⁺ , K ⁺ , Cs ⁺ , Rb ⁺)	All	---
Nitrates (NO ₃ ⁻), Chlorates (ClO ₃ ⁻), perchlorates (ClO ₄ ⁻) & Acetates (C ₂ H ₃ O ₂ ⁻)	Most	AgC ₂ H ₃ O ₂ , Hg ₂ (C ₂ H ₃ O ₂) ₂ , Ni(ClO ₃) ₂
Chlorides (Cl ⁻), bromides (Br ⁻) and iodides (I ⁻)	Most	Lead(II), Mercury(I) (Hg ₂ ²⁺), Silver, Copper(I)
Sulfates (SO ₄ ²⁻)	Many	Strontium, Barium, Calcium, Silver, Lead(II), Mercury(I) (Hg ₂ ²⁺)
Hydroxides (OH ⁻)	Group IA metals, Ammonium	Group IIA metals are slightly soluble & transition metals/Al ³⁺ are insoluble
Sulfides	Ammonium, Group IA metals, Group IIA metals	Many, except those listed as soluble
Carbonates (CO ₃ ²⁻), Phosphates (PO ₄ ³⁻), Sulfites (SO ₃ ²⁻), Chromates (CrO ₄ ²⁻) & Arsenates (AsO ₄ ²⁻)	Ammonium Group IA metals	Many, except those listed as soluble