

Summary of Elemental Ions and Polyatomic Ions

| Element | Anions | Polyatomic Ions | | | Acids * | |
|--|---|---|---|---|---|--|
| carbon C | carbide C = -4 C ₂ = -2 | carbonate CO ₃ ²⁻ | bicarbonate HCO ₃ ²⁻ aka: hydrogen carbonate | acetate C ₂ H ₃ O ₂ ⁻ or CH ₃ COO ⁻ | H ₂ CO ₃ - carbonic acid - actually CO ₂ (aq) HC ₂ H ₃ O ₂ or CH ₃ COOH - acetic acid or ethanoic acid | |
| chlorine Cl also applies to bromine and iodine | chloride Cl ⁻ bromide Br ⁻ iodide I ⁻ | perchlorate ClO ₄ ⁻ chlorite ClO ₂ ⁻ | chlorate ClO ₃ ⁻ hypochlorite ClO ⁻ or OCl ⁻ | perbromate BrO ₄ ⁻ bromate BrO ₃ ⁻ bromite BrO ₂ ⁻ hypobromite BrO ⁻ | periodate IO ₄ ⁻ iodate IO ₃ ⁻ iodite IO ₂ ⁻ hypoiodite IO ⁻ | HCl – hydrochloric acid HClO ₄ – perchloric acid - HOClO ₃ HClO ₃ – chloric acid - HOClO ₂ HClO ₂ – chlorous acid - HOClO HClO - hypochlorous acid - HOCl |
| fluorine F | fluoride F ⁻ | hexafluorosilicate SiF ₆ ²⁻ | There are no polyatomic ions where F has a positive oxidation state. | | HF – hydrofluoric acid | |
| nitrogen N | nitride N = -3 | nitrate NO ₃ ⁻ | nitrite NO ₂ ⁻ | ammonium NH ₄ ⁺ | HNO ₃ – nitric acid HNO ₂ – nitrous acid | |
| oxygen O | oxide O = -2 | hydroxide OH ⁻ | hydronium H ₃ O ⁺ (hydrated hydrogen ion) | peroxide O ₂ = -2 | H ₂ O or HOH – water can behave as either an acid or a base - <i>amphoteric</i> | |
| phosphorus P also applies to arsenic | phosphide P = -3 arsenide As = -3 | phosphate PO ₄ ³⁻ hydrogen phosphate HPO ₄ ²⁻ <i>(Also applies to phosphite, i.e. hydrogen phosphite, HPO₃²⁻)</i> | phosphite PO ₃ ³⁻ dihydrogen phosphate H ₂ PO ₄ ⁻ | arsenate AsO ₄ ³⁻ arsenite AsO ₃ ³⁻ | H ₃ PO ₄ - phosphoric acid - PO(OH) ₃ H ₃ PO ₃ - phosphonic acid - PHO(OH) ₂ H ₃ PO ₃ - phosphorous acid - P(OH) ₃ H ₃ PO ₂ - hypophosphorous acid - PH ₂ O(OH) H ₃ PO ₂ - phosphinic acid - PH(OH) ₂ H ₃ PO - phophinous acid - PH ₂ OH H ₃ PO - phosphine oxide - PH ₃ O H ₃ P - phosphine - PH ₃ | |
| sulfur S also applies to selenium and tellurium | sulfide S ²⁻ selenide Se ²⁻ telluride Te ²⁻ | sulfate SO ₄ ²⁻ bisulfate or hydrogen sulfate HSO ₄ ⁻ | sulfite SO ₃ ²⁻ bisulfite or hydrogen sulfite HSO ₃ ⁻ | selenate SeO ₄ ²⁻ selenite SeO ₃ ²⁻ persulfide S ₂ = -2 hydrogen sulfide HS ⁻ | H ₂ S – hydrosulfuric acid H ₂ SO ₄ – sulfuric acid H ₂ SO ₃ – sulfurous acid - actually SO ₂ (aq) | |

* Memorize the names and formulas of these common laboratory acids: HCl, HNO₃, H₂SO₄, HC₂H₃O₂

Know the strong acids: HCl, HBr, HI, HNO₃, HClO₄, H₂SO₄ (but only for the first H⁺). All other acids are weak acids in aqueous solution.

Anions in gray boxes do not exist in aqueous solution. Oxidation number is given in lieu of ionic charge.

Other simple organic acids: COOH - methanoic (formic) acid, CH₃CH₂COOH - propanoic acid

Revised 02/25/12