

Things to Know From Prerequisite Courses

This is not intended to be an exhaustive list of everything you are supposed to remember, but gives an idea of the kinds of skills you may be called upon to display in the thermodynamics part of the course.

General scientific knowledge

- The common SI prefixes: f (10^{-15}), p (10^{-12}), n (10^{-9}), μ (10^{-6}), m (10^{-3}), k (10^3), M (10^6), G (10^9)

Basic chemical knowledge

- The names and symbols of all elements in groups 1, 2 and 17, and the names, symbols and positions in the periodic table of all additional elements in the first three periods (up to argon).
- The names and formulas of common molecular compounds: ammonia (NH_3), water (H_2O), methane (CH_4).
- The names and formulas of common polyatomic ions: ammonium (NH_4^+), carbonate (CO_3^{2-}), cyanide (CN^-), hydroxide (OH^-), nitrate (NO_3^-), permanganate (MnO_4^-), phosphate (PO_4^{3-}), sulfate (SO_4^{2-}) and acetate (CH_3COO^-).
- The names and formulas of the common acids: hydrofluoric (HF), hydrochloric (HCl), hydrobromic (HBr), hydroiodic (HI), nitric (HNO_3), sulfuric (H_2SO_4), phosphoric (H_3PO_4), carbonic (H_2CO_3) and acetic (CH_3COOH).
- Chemical nomenclature of ionic compounds (including hydrates) and of molecular compounds
- Ionic compounds of the alkali metals, ammonium and nitrate are all very soluble in water. Ionic compounds in which both ions have charges greater than 2 are almost always sparingly soluble in water. In other cases, it is best to look up the solubility.

- The common strong acids are HCl (hydrochloric), HBr (hydrobromic), HI (hydroiodic), HNO₃ (nitric) and H₂SO₄ (sulfuric). In the case of sulfuric acid, only the first proton completely dissociates. The hydrogen sulfate anion (HSO₄⁻) is a weak acid.
- The common strong bases are the soluble hydroxides.
- How to convert between mass, number and volume using the molar mass and density
- The relationship $c = n/V$ between concentration, number of moles and volume, and the interpretation of this relationship for ionic solutions
- How to balance chemical reactions

Physics and physical chemistry

- The SI units of pressure (Pa) and volume (m³)
- The ideal gas law: $PV = nRT$
- The concept of work
- The definition of power

Mathematics

- How to compute simple derivatives and integrals, including definite integrals