

4.1: What is UltraHigh Vacuum?

Vacuum technology has advanced considerably over the last 25 years and very low pressures are now routinely obtainable. Firstly, we need to remind ourselves of the units of pressure:

- The SI unit of pressure is the Pascal ($1 \text{ Pa} = 1 \text{ N m}^{-2}$)
- Normal atmospheric pressure (1 atm.) is 101325 Pa or 1013 mbar ($1 \text{ bar} = 10^5 \text{ Pa}$).
- An older unit of pressure is the Torr ($1 \text{ Torr} = 1 \text{ mmHg}$). One atmosphere is ca. 760 Torr (i.e. $1 \text{ Torr} = 133.3 \text{ Pa}$).

While the mbar is often used as a unit of pressure for describing the level of vacuum, the most commonly employed unit is still the Torr (the [SI unit](#), the Pa, is almost never used). Classification of the degree of vacuum is hardly an exact science - it much depends upon who you are talking to - but as a rough guideline:

Rough (low) vacuum:	$1 - 10^{-3} \text{ Torr}$
Medium vacuum:	$10^{-3} - 10^{-5} \text{ Torr}$
High vacuum (HV):	$10^{-6} - 10^{-8} \text{ Torr}$
Ultrahigh vacuum (UHV):	$< 10^{-9} \text{ Torr}$

Virtually all surface studies are carried out under UHV conditions - the question is **why** ? This is the question that we will address in [Section 4.2](#).

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