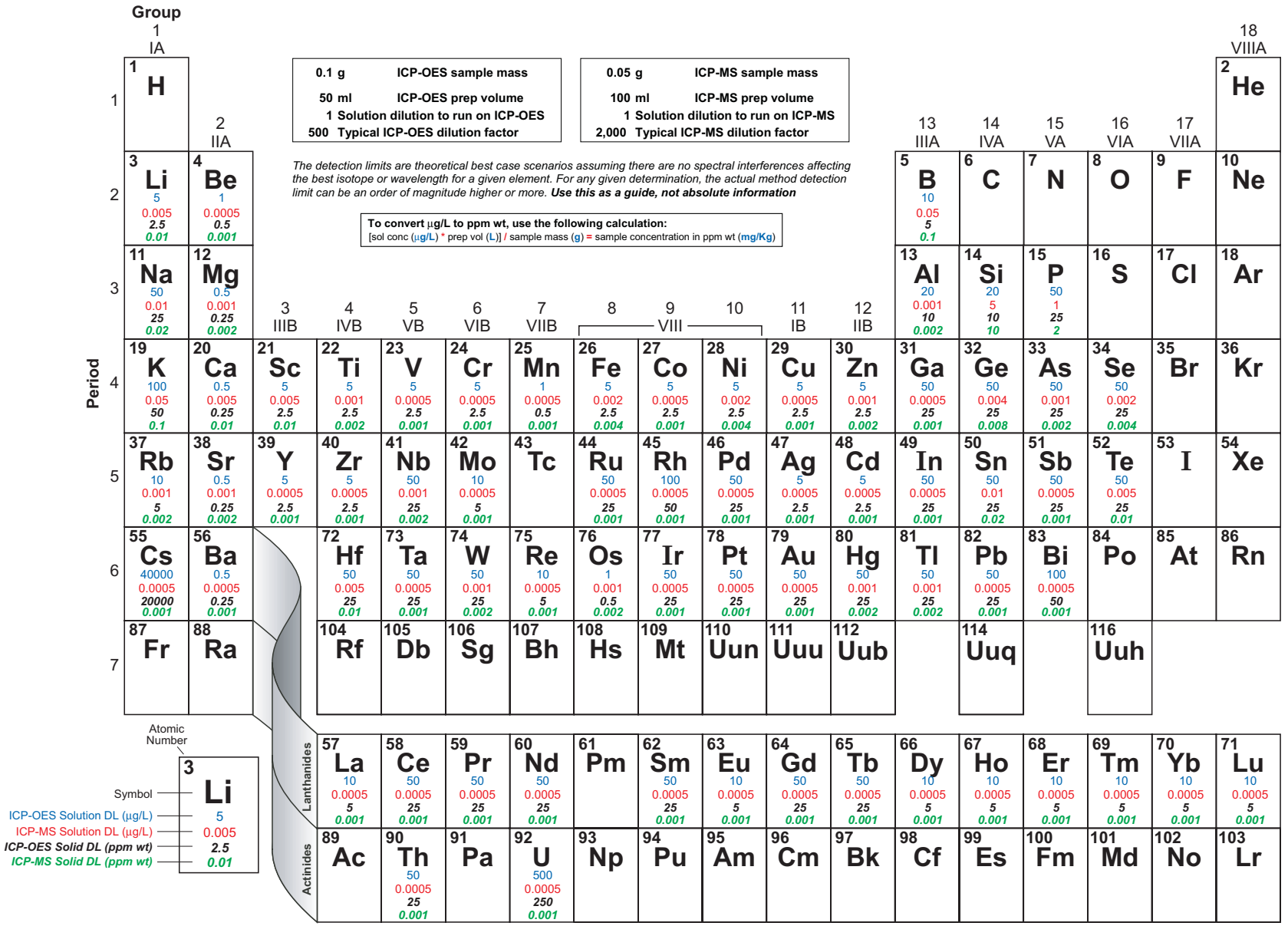
ICP-OES and ICP-MS Detection Limit Guidance



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Inductively Coupled Plasma Spectroscopy

Inductively Coupled Plasma Spectroscopy techniques are "wet" sampling methods where samples are introduced in liquid form for analysis.

In plasma emission spectroscopy (OES), a sample solution is introduced into the core of inductively coupled argon plasma (ICP), which generates temperature of approximately 8000°C. At this temperature all elements become thermally excited and emit light at their characteristic wavelengths. This light is collected by the spectrometer and passes through a diffraction grating that serves to resolve the light into a spectrum of its constituent wavelengths. Within the spectrometer, this diffracted light is then collected by wavelength and amplified to yield an intensity measurement that can be converted to an elemental concentration by comparison with calibration standards.

In plasma mass spectroscopy (MS), the inductively coupled argon plasma (ICP) is once again used as an excitation source for the elements of interest. However in contrast to OES, the plasma in ICP-MS is used to generate ions that are then introduced to the mass analyzer. These ions are then separated and collected according to their mass to charge ratios. The constituents of an unknown sample can then be identified and measured. ICP-MS offers extremely high sensitivity to a wide range of elements.

Strengths	Limitations
Up to 70 elements can be determined simultaneously in a single sample analysis.	The emission spectra are complex and inter-element interferences are possible if the wavelength of the element of interest is very close to that of another element.
The useful working range is over several orders of magnitude.	During Mass Spectrometry, the common matrix elements and other molecular species can interfere with the measurement of some elements. Doubly charged or molecular ionic species can create difficulties in quantifications.
Instrumentation is suitable to automation, thus enhancing accuracy, precision and throughput.	The sample to be analyzed must be digested prior to analysis in order to dissolve the element(s) of interest.

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