How to use the tables

"Tables of Gemstone Identification" intends to facilitate the determination of the mineralogical or organic identity of gem materials. Although occasionally mentioned, differentiation between natural and synthetic origin and detection of treatments is beyond the scope of this work.

For identification, "Table 1" (Gemstones listed by refractive index), "Table 2" (Opaque and translucent stones) and/or "Table 3" (Gemstones listed by density) are the first to be consulted.

For confirmation, see "Table 4" (Spectra) and/or "Table 5" (Alphabetical index with supplementary information).

For differentiation of stones, belonging to particular groups, see "Table 6" (Glass), "Table 7" (Garnet group) or "Table 8" (Diamond imitations).

Names in blue indicate important commercial stones.
Names in orange indicate artificial products.

Table 1: Gemstones listed by refractive index

Stones are listed with increasing refractive index, using the lowest refractive index value, indicated in red, as a reference.
Arrows in the first column indicate that the stone may occur in a higher and/or a lower refractive index range.
The extremely wide refractive index range of glass would result in a confusing and unnecessary repeating of this substance all through the list. Constantly keeping glass in mind as a possibility, the gemmologist should refer to "Table 6" for further identification.

Relevant n_y-values of biaxial stones are mentioned under "remarks".

In column "Sp", the presence of a relevant visible spectrum, as seen with a handheld spectroscope, is indicated.

Table 2: Opaque and translucent stones

Stones are grouped following their most encountered colours and listed following increasing refractive index. Limitations in the use of the polariscope and/or the refractometer make density (see "Table 3") and "Special properties" become more important in case of opaque stones.

Table 3: Gemstones listed by density

Stones are situated in density groups, increasing with 0.01 density steps. Stones, belonging to a particular density group, are listed following optic character and further following refractive index. Aggregates, rocks and other inhomogeneous substances are listed with the optic character of their main component or with "NN" if not exactly known.
Almost every stone will appear in several consecutive density groups, making comparison between a measured density and optic data faster and easier.
For glass, a similar remark as under "Table 1" can be made.

Table 4: Spectra

Stones are listed in alphabetical order. Absorption spectra and occasionally emission lines in the visible range are represented as seen by a handheld diffraction grating spectroscope. The absence of a wavelength scale in most of these instruments forces the gemmologist to rely upon visual comparison. Translation into spectra, taken with a prism spectroscope is facilitated by the numerical description of absorption bands and lines.
Only relevant spectra, diagnostic or confirmative, are mentioned and only relevant and perceptible bands or lines are visualised. Faint or occasional bands and lines are numerically described for detailed information.
Different spectrum intensities, depending only upon colour saturation of a particular stone, are not separately visualised.

Table 5: Alphabetical index with supplementary information

Stones are listed in alphabetical order. Supplementary information (colour, chemical composition, hardness, crystal system, cleavage, lustre, origin, mineral group…), although not immediately related to the identification, provides a possible confirmation of an obtained result.
The given refractive index, printed in red, is the reference index of "Table 1". Synthetic stones, unless with significantly different optical properties, are not mentioned separately from their natural counterparts.

Table 6: Glass

Glass being the most encountered imitation material, its gemmological properties cover a wide range of values. The relationship between refractive index and density is shown in a graph.

Table 7: Garnet group

The garnet group represents several commercially important gemstones such as pyrope, "mandarin garnet", "tsavorite", demantoid, "malaya" and rhodolite. Correct identification may be difficult but is usually possible with the right combination of refractive index, density, spectrum and colour.
In this table, several garnets are described as binary solid solutions. The presence of an additional garnet component will result in broader ranges of physical properties, but can often be detected by careful examination with the spectroscope.
Garnets with problematic differentiation are grouped on separate pages and important discriminative factors are indicated.

Table 8: Diamond imitations

Diamond imitations with refractive index above 1.81 are separated in optically isotropic and anisotropic groups and further listed with increasing density.