

LMHC Information Sheet # 14

Cobalt Spinel

- Definition
- Suggested identification
- Report wording

Members of the Laboratory Manual Harmonisation Committee (LMHC) have standardised the nomenclature that they use to describe cobalt spinel.

Definition

Cobalt spinel is a Mg-Al spinel of blue colour containing traces of cobalt. Its blue colour is mainly due to absorption bands related to cobalt. In rare cases, cobalt-bearing spinel may show a slight to moderate colour-change from blue (daylight) to purple (incandescent light). Cobalt spinel may occur in a range from strong (vivid) blue to medium blue saturation. Spinel which are coloured by cobalt induced by a treatment process (e.g. Co-diffusion or filling of fissures with Co-glass) do not qualify to be called cobalt spinel.

Suggested identification

Cobalt (Co^{2+}) is a strong chromophore and may already at low trace element level (10s to 100s ppm) induce a distinct to strong blue colour in spinel due to Co-related absorption bands in the absorption spectrum. In most cases, the cobalt concentration is below detection limit of X-ray fluorescence instruments, but clearly detectable by mass spectrometry (e.g. LAICPMS).

Natural spinel always contains also distinct concentrations of iron which may influence the absorption spectrum (and blue colour) of the spinel. If the iron bands in the absorption spectrum dominate over the cobalt bands, then the blue spinel does not qualify to be called cobalt spinel, even if cobalt is present at trace element level. Usually such iron-dominant spinels are greyish to slightly greenish blue.

For a clear separation, we suggest using below figure with absorption spectra of cobalt-spinel compared to a blue spinel mainly coloured by iron.

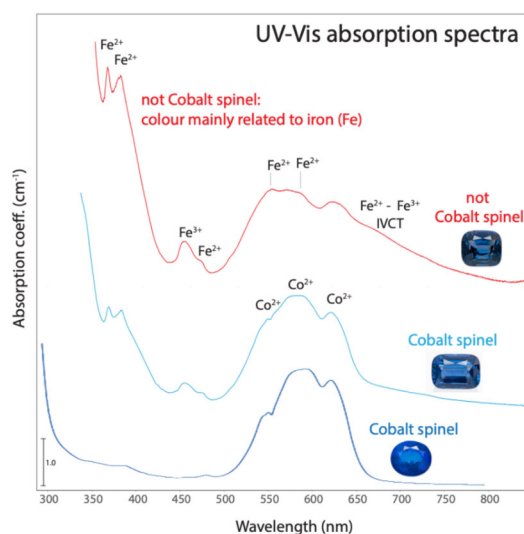


Figure 1: Absorption spectra of two cobalt spinels and a blue spinel mainly dominated by iron-related absorption bands (not cobalt spinel).

Report wording

Cobalt spinel shall be described as,

Identification:

Species: **(natural)¹ spinel**

Variety: **(cobalt)¹ spinel**

Further information in case cobalt spinel is not used in the 'variety' section, then
(may be called cobalt spinel in the trade)¹

¹ Wording and text in parentheses is optional.