

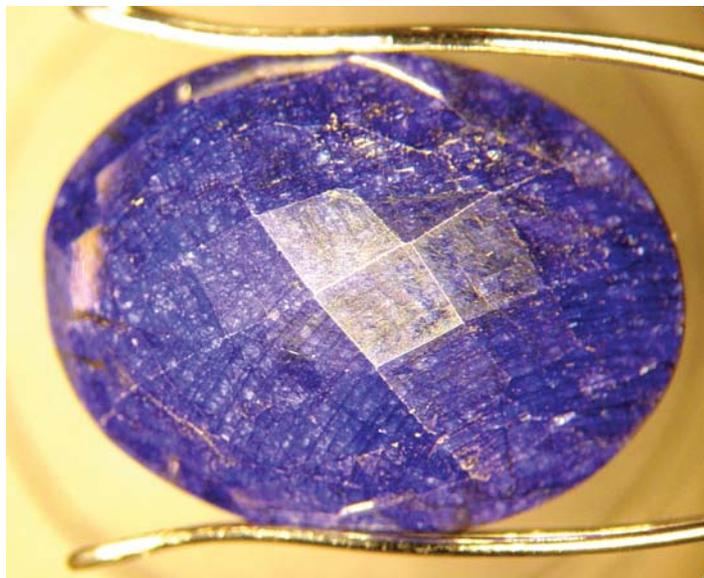
Seeing red

Cara Williams FGA discusses the limitations of using the Chelsea Colour Filter to identify treated blue sapphire.

While the Chelsea Colour Filter (CCF) can help to identify when a sapphire is filled with cobalt-coloured lead glass, it is not diagnostic. Quick tests can lead to the wrong conclusions if all parameters are not understood. While such tests often provide a quick and handy means of eliminating certain options, they can seldom be relied on for diagnostic identification. When cobalt-coloured, lead glass-filled sapphires ('hybrid sapphire') first began to enter the market in a significant way, I advised clients that there was little to worry about regarding this material as it was readily identifiable with the CCF, which would make it appear red rather than the greenish colour of naturally coloured blue sapphire. This quick test was proven



1: Dyed opaque sapphires showing deep royal blue colour.

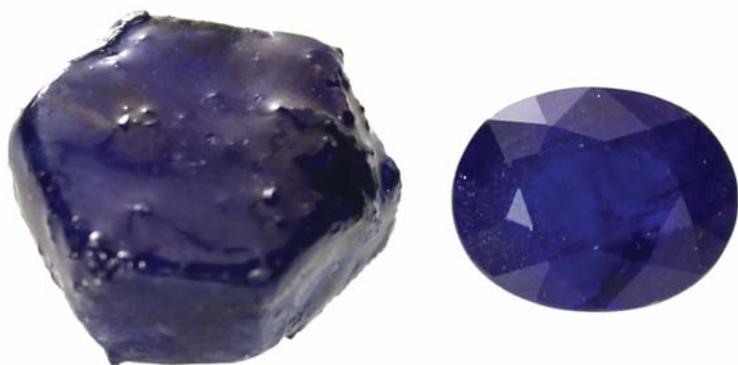


2: Close-up showing dye concentrations along fissures and twin planes.

insufficient when sapphires set in silver jewellery (1) were recently submitted to confirm treatment by lead glass filling. These stones were obviously not glass-filled and tested negative for either cobalt or lead, yet still appeared red when viewed through the CCF. It was explained to the client that it is not just cobalt that will cause this reaction. If one digs far enough, there is an exception to every rule in gemmology.

The submitted items were not gem grade sapphires, but even this term needs revision, as nowadays it is very common to see this grade of gem material — what we once considered non-gem grade or specimen grade — set in fine jewellery with diamonds. Many of these stones are completely natural, such as well-formed but opaque diamond crystals or sapphire slices, while others are treated in various ways. These stones were opaque and resembled deep blue lapis lazuli, especially with the sub-surface fissures creating a reflectance effect, subtly twinkling like pyrite inclusions might do.





3: Cobalt-coloured lead glass-filled sapphire ('hybrid sapphire'), faceted and rough.

Microscopic observation revealed numerous surface pits and repeated twinning with open fissures, typical of low-grade corundum that could allow the admission of foreign substances (2). Following these lines were concentrations of blue colour. There was none of the glassy, smooth appearance of a filled gemstone (3), and fissures remained unfilled, although there were minor polishing residues that remained within some surface pits. No fluorescence was observed under UV excitation. RI readings were not ideal due to the irregular surface, but weak dual RI readings of approximately 1.76 and 1.77 confirmed these to be corundum. Identification as corundum was further confirmed on several surfaces with Raman, which will also detect glass when present.

Swabbing with acetone yielded very little colour in this case — so little as to be inconclusive whether it was dye or merely polishing

residues. As destructive testing was not possible, the original colour could not be determined. It should be noted that some dyes are much less impervious to solvents, some even water-soluble.

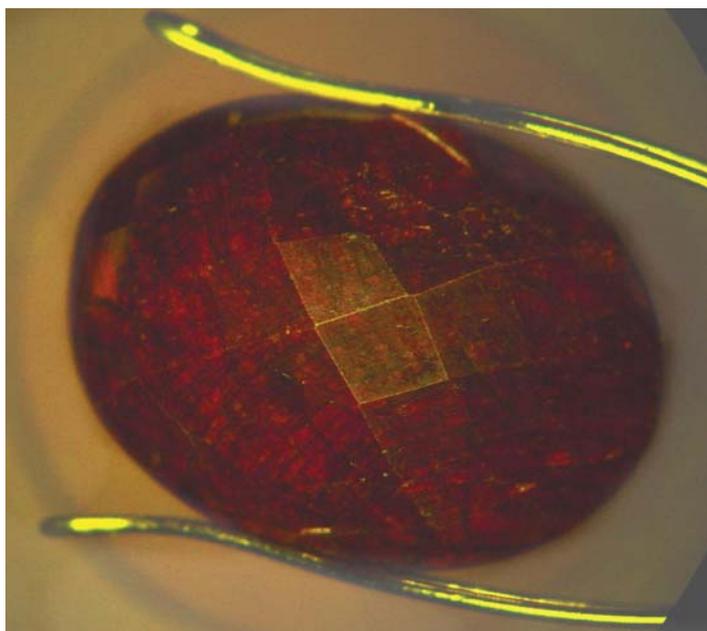
The CCF can identify these as other than natural blue corundum (4), but further observation and testing should be done to confirm whether the stone is dyed or filled with cobalt-coloured lead glass. Cobalt will cause the lead glass filler to fluoresce, but the high iron content of these stones and the nature of this dye did not allow any fluorescence to be observed. Cobalt glass-treated sapphire will also commonly show air bubbles within the glass areas, but the opacity of these specimens prevented the observance of any internal features.



5: These dyed corunda were originally greyish in colour. CCF reactions were the opposite of what would be expected based on appearance.

It should be noted that corundum of low quality can be dyed in various colours. Grey corundum that has been dyed red is not ruby, although it may look like it and test like ruby in some ways. Green dyes may cause a stone to resemble emerald, but such material would not qualify as emerald or green sapphire; it is best described as dyed green corundum (5).

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4: Dyed sapphire viewed through CCF.