

# THE CHELSEA COLOUR FILTER

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# **THE CHELSEA FILTER**

## **INTRODUCTION**

Some stones appear to change colour when viewed through the Chelsea Colour Filter. This colour change helps identify many gemstones, distinguishing ruby from paste; distinguishing garnet (though not all garnets) emerald and aquamarine from paste. The Chelsea Filter also distinguishes many manmade stone such as cobalt-blue glass and blue synthetic spinel from natural blue stones. As with all gem testers care must be taken since nature does not make gemstones to standard formulae and variations exist.

## **HOW TO USE A CHELSEA FILTER**

Hold the filter an inch or two from the eye. Light the stone with a strong light bulb or torch. The stone may appear to change colour. The filter must be held near to the eye but there is no need to hold the filter close to the stone, even items in showcases can be examined providing they are lit by strong lights.

## **HOW IT WORKS**

White light is made up of all the colours of the rainbow (a spectrum): red, yellow, green, blue. Colours are known, technically, as wavelengths of light. A gemstone will absorb some wavelengths and leave the others free to reach the eye. It is these which mingle to give the appearance of colour. Emerald absorbs virtually all the yellow/green wavelengths; the Chelsea colour filter filters out all but the yellow/green and deep red wavelengths. Since the yellow/green has already been absorbed by the emerald only red is left to pass through the filter.

## **THE IDENTIFICATION OF EMERALD**

Most emerald will appear to change from green to red when viewed through the filter, paste and other stones remain green/dark through the filter. The brightness of the red depends on the amount of chromium in the stone. There is no chromium in most green stones; in natural emeralds chromium is present in small quantities; in synthetic<sup>1</sup> emeralds chromium is present in large quantities. Therefore paste, peridot, sapphire etc. appear green/dark through the filter; most natural emeralds will appear red (from dull red to bright red) through the filter; synthetic emeralds will often appear a brilliant

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<sup>1</sup> A natural gemstone is grown in the ground by nature, a synthetic gemstone is grown in a laboratory by man. It is not always possible to distinguish a synthetic from a natural gemstone as the two are often chemically and optically identical.

glowing traffic light red. HOWEVER, some modern synthetic emeralds appear only a dull red and some natural emeralds do not appear red at all. The Chelsea Colour filter, originally designed for testing emeralds, will give a good indication that you may, or may not, have an emerald but will not give a simple YES or NO reading, it is more useful for the testing of other gemstones.

### OTHER GEMSTONES - INSTRUCTIONS IN BRIEF

Of **GREEN** stones the following will remain green through the filter: Enstatite, paste, peridot, sapphire, most tourmaline.

The following GREEN stones appear to change colour when viewed through the filter:

Alexandrite	Red in artificial light, brighter red in daylight.
Zircon	Reddish
Demantoid garnet	Reddish
Emerald	Red - see fist page and see below.
Aquamarine	A murky grey-green.

There is a synthetic corundum which looks like alexandrite, this will appear the same red through the filter in both artificial light and daylight.

Of **RED** stones garnets and pastes appear dark red through the filter; ruby (both natural and synthetic) and spinel glow red.

Of **BLUE** stones:

Paste	Red (for dark blue pastes) to green (for light blue pastes)
Spinel	Red (for dark blue spinels to orange (for synthetic light blue spinels)
Zircon	Green

Only one natural blue stone gives distinctive results:  
MOST blue sapphires will appear blackish

## INSTRUCTIONS IN MORE DETAIL

Newcomers to gemmology ask of a gem tester: Is it 100% reliable? The answer is that no gem tester is "100% reliable" because the composition of gemstones is not "100% reliable" - such is the variety in nature. A Chelsea Filter detects the presence of Chromium and Cobalt. Chromium produces the very intense reds and greens of ruby and emerald; cobalt causes the brilliant blue in pastes and synthetic gemstones. The extent of the colour change depends on the amount of chromium or cobalt present.

### **RED STONES**

Red stones containing chromium are most ruby (Burma ruby and synthetic ruby) and red spinel (almost certain to be natural spinel) - all will glow red.

Thai ruby (Siam ruby) and pyrope garnet contain chromium too but they also contain iron which prevents the colour change. Demantoid garnet will appear pinkish.

Red stones which contain no chromium will show no colour change. They will appear a dark red / blackish colour (because the filter is so dark, not much can be seen). These include most garnets and paste.

If you have a parcel of red stones, pick out those which glow a brilliant red (synthetic rubies coloured by chromium), those which glow slightly red (natural rubies and natural spinels), those which turn very slightly reddish or pinkish (MAYBE Thai ruby or demantoid garnet), and those which remain their own red darkened by the filter to almost black, pastes and most garnets.

### **GREEN STONES**

The GREEN stone coloured by chromium is beryl, the best known varieties of which are emerald and aquamarine. The colour change in emerald is to red and, again, the brilliance of the red and the extent to which it appears to 'glow' depends upon how much chromium is in the particular stone and how much iron is present to dull the effect. Synthetic emeralds are coloured with chromium with the result that the red glow seen through the filter can be quite spectacular; the red glow seen in natural emeralds varies from strong for Colombian and Russian emeralds to nil for South African and Indian emeralds. The lack of a colour change to red is an indication that your stone is not emerald, but not proof; a brilliant glowing traffic light red is a good indication that you have a synthetic emerald but not proof.

Three stones which can be confused with emerald are demantoid garnet, grossular garnet coloured by Chromium (Savolite) and tourmaline coloured by Chromium - all will appear red through the Chelsea filter.

How, then, do you distinguish these from emeralds? Green zircon may appear a pinkish colour through the filter. Green garnets have a far 'livelier' appearance than emeralds; emeralds can appear almost 'oily' in lustre, garnets have a brilliant 'fire'. Both tourmaline and zircon exhibit strong double refraction: look into the stone with a good 10X lens and the back facets will appear 'doubled'.

In the case of aquamarine iron dulls the effect almost completely but there is still a colour change from a clear blue-green to a muddy grey-green. Beware: some sapphires also appear 'muddy'.

Alexandrite appears red (see previous page), pastes, green sapphire, enstatite, peridot and most tourmalines will remain dark / green.

Stones which usually show only a slight colour change are green garnet (demantoid), green zircon, and chalcedony which has been stained green - these will appear reddish or pinkish.

## **BLUE STONES**

The filter is most useful for the detection of cobalt. Cobalt colours glass and synthetic spinel blue, it almost never produces blue in nature. Synthetic spinel is used to imitate a number of stones. The colour change is to red for heavily doped stones (brilliant 'cobalt blue' glass and deep blue synthetic spinels) but is less pronounced in light blue stones, varying from orangey-browns to green. Although a colour change from brilliant blue to glowing red is a clear sign that the stone is manmade, intermediate colour changes can be inconclusive: natural blue spinel can appear very slightly red as can SOME Ceylon sapphires. Most blue sapphires show no colour change, remaining dark blue / blackish.



## CARE OF THE CHELSEA FILTER

- Do not touch the filter (use a soft *dry* cloth to remove dust)
- Do not allow to become hot, e.g. on a radiator or in direct sunlight
- Do not immerse in liquid
- Keep it folded closed when not in use