So You Want to Buy a Loupe?

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Gemmology Online

One of my most used pieces of equipment for looking at cut stones and identifying rocks is a 10X loupe or hand lens. I am continually amazed by what you can learn with a hand lens and how important it is to lapidarists, metalsmiths and gemmologists. It is the most important piece of equipment that you can have in your kit of tools, is relatively inexpensive, is simple to learn to use and is light enough to carry everywhere. A 10X loupe should be able to be purchased for less than $50 but before you rush out and buy one, read on so that you can get the loupe best suited for your needs.

"10X" means that it will magnify an image by 10 times. Loupes will come in different levels of magnification from 3X up to 20X. The 10X is the most commonly quoted in lapidary competitions for checking scratches and surface imperfections. A 10X is also the standard for grading diamonds. This means for lapidary work a 10X loupe is the largest magnification that you will need. Additionally, larger magnification loupes will have a shorter working distance. Generally a 10X loupe will have a working distance of about 2.5cm – distance between the lens and the stone being examined. A 20X loupe will have a working distance of half of that.

When buying a loupe look for one with a matte black casing on the lens. The matte black will eliminate any potential light reflections that silver or gold casings can cause, which can alter the perception of colours of the stone that you are viewing.

Lenses are cut in different shapes (convex, concave and combinations). This is to eliminate spherical and chromatic aberrations, which would distort the image. To overcome the distortions, 2 or 3 convex and concave lens are glued together Loupes with 2 lenses are known as "doublet" loupes while the "triplet" loupes have 3 lenses of various shapes bonded together. Loupes will generally be stamped with the magnification and the type e.g. "10X Triplet". If the lens does not have "Triplet" on the lens case then it is not safe to assume it is a triplet lens – irregardless of what the salesperson tells you.

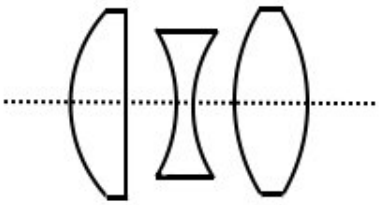
Chromatic aberration refers to color fringing of the image due to dispersion inside the glass lens. The outer edges of the lens refract the most and hence more dispersion will occur from light rays at those points. To overcome this, two lenses (one bi-concave and one bi-convex) are placed side by side. Loupes that are corrected for chromatic aberration are named "achromatic".

Lenses also suffer from spherical distortion, also caused by differences in refraction on the outer edges from the lens and the rays which travel through the center. This results in a hazy and out of focus view. Correction can be achieved by adding a lens with different curves in the loupe. A spherical corrected loupe is called "aplanic".

If a lens is corrected for both chromatic and spherical dispersion then it is called "apochromatic".

The triplet loupe consists of three lenses bonded close together. In the image below are the three lenses that make up a triplet loupe (other configurations are possible). From left to right they are:

- A plano-convex lens to eliminate the spherical aberration
- A bi-concave lens
- A bi-convex lens



Three lens Triplet

The latter two overcome the chromatic aberration. All three together they form an apochromatic loupe. This is the loupe you will need as a gemologist or lapidarist.

Before you purchase a 10X loupe you should test it to see that both the chromatic and spherical distortions have been eliinated. You can test your loupe for chromatic aberration by looking at a white light source through your loupe. If the image remains white (also on the outer edge) it will be achromatic. Spherical aberration can be tested on squared drawing paper. The squares should remain square in the total view of your loupe.

To use your loupe, fold out the lens and hold the case between your thumb and forefinger. Place your thumb against your cheekbone and against the side of your nose to help steady the lens. Then bring the stone up towards the lens until it is in focus, which should be around 2.5 cm with the 10X triplet. Having the sun or a light source over your shoulder may also be an advantage.

All that is left is to practice, particularly saying “I have an apochromatic triplet loupe”. Good luck.