Night Light
The Miniature Lamp Collectors Club

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Night Lights: Turn on the Dark

Enjoying Your Lamps When the Lights Go Out With the Help of a Little Black (Light) Magic

By Barry Schwartz and Rick Hornwood

Try this sometime: First get yourself a relatively powerful ultra-violet or “black light” (we generally use an 18” fluorescent tube “black” light in a semi-portable electric fixture although a wide variety of other both electric outlet and battery powered “black” lights are available). “Black” lights are called that because they emit light which is below the visible spectrum.

Then on a dark night take your black light (if necessary with an extension cord) into the room where you have your miniature lamps. Turn off all the lights and then turn on the “black” light. Move the black light around close to the lamps. You should see that some of your lamps glow, or fluoresce. Some may glow gently while others will glow more intensely; some may glow green and yet others may glow with various shades of orange. Most often the entire lamp will glow, but sometimes just parts of either the shade or base will glow (generally, we believe, the parts that glow are where the glass is thinnest).

What is fluorescence? Fluorescence is a natural phenomenon with a fairly complicated and extensive definition in physics and chemistry. But in its simplest terms fluorescence occurs in certain substances when electromagnetic radiation, a form of energy, (such as light within a specified range of wavelengths) is absorbed by an object. The absorbed energy excites molecules within the object and causes them to emit electromagnetic radiation (light) of a different, and usually longer, wavelength than the original absorbed light. Thus when ultra-violet light (which has a wavelength below, or shorter than, what the human eye can see) is absorbed by a fluorescent object, the object emits a longer wavelength light which can be seen by the human eye.

Many natural occurring materials, including various minerals, chemicals and biological substances have fluorescent properties. Any one who has watched any of the numerous forensic science-based shows on television (such as CSI) is familiar with the fact that various bodily fluids glow when exposed to “black” light. Tonic water fluoresces blue under black light (due to the naturally occurring compound quinine which it contains); petroleum jelly (such as Vaseline; more about Vaseline later) also glows blue and the modern $20 bill has a strip on it which will glow green.

About 15% of all known minerals fluoresce when viewed under black light. Generally, this fluorescence is generally caused by trace elements called “activators” contained in the mineral sample. Different activators can cause a given mineral to fluoresce with different colors. The presence of other trace elements (known as “quenchers”), such as ferrous iron, can dampen or negate

Grand Val's Time & Light, S1-23

Atterbury Log Cabin, S1-50

Annie Rooney, S1-148

Figure I: Three clear lamps which fluoresce with a soft yellow green color due to Manganese Dioxide used as a clarifying agent.

the fluorescent effect of an activator. A few pure minerals (without the presence of activators) will also fluoresce. Thus a given mineral may or may not fluoresce and different samples of the same mineral may fluoresce with different colors.

Only two minerals, however, cause almost all of the commonly seen fluorescence in the glass lamps (or other glass items) we collect. Both of these minerals have been used extensively in the manufacture of glass. They are Uranium and Manganese.

Manganese, perhaps, is the most interesting of these two because it has the longest history in glass-making, the most different uses and the most different effects. Manganese is one of two minerals which took its name from a region in which it was commonly found: Magnesia (an area now in Greece). Both were called “magnes” and were thought to differ in gender. The male magnes attracted iron and was in fact, magnetite or lodestone. Hence, it is believed, the word “magnet”. The female magnes, later known as magnesia, is now called pyrolusite or Manganese (from the German “Mangan”) Dioxide.

Manganese Dioxide was found by early glassmakers to have a very useful property. The natural elements from which glass is made virtually always have impurities and especially iron impurities. These iron impurities caused glass to have a dull green or brownish color; the greenish color of old Coca Cola bottles is the effect of these impurities. Early glassmakers discovered that these iron impurities could be neutralized by the

Stars & Bars, S1-482

Blue Satin Drape
S1-231

H1-215, Clear Base
Satinized Shade

S2-419, Blue Uranium Glass

Green Satin Tulip, S1-284

Figure 3: A selection of green (Vaseline) and blue Uranium Glass lamps

addition of small amounts of Manganese Dioxide to the molten glass mixture. Thus clear, uncolored, glass could be produced. Known as “glassmaker’s soap”, Manganese Dioxide was used by early Roman and Egyptian glassmakers to create clear glass. It continued to be used for this purpose until World War I. Because Manganese was a strategic war material and because supply lines in Europe (there is apparently no commercially viable source of Manganese in the Americas) were disrupted by the war, Manganese became unavailable to glassmakers. So they turned to other elements (e.g. selenium or arsenic) to clarify their glass. Manganese Dioxide has an unusual property. It fluoresces when viewed under relatively long wave (Ultraviolet “C”) “black” light. (Light in the ultraviolet spectrum is generally divided in 3 classes, A, B and C, with “A” having the shortest wave lengths and “C” the longest; this will become relevant later on). The fluorescent property of Manganese Dioxide thus becomes useful in ascertaining when (in a binary fashion — either before or after World War I or about 1915) a given piece of glass was made. If it fluoresces, it was most likely made before the war and if it doesn’t it was most likely made after the war.

Bring your black light close to some of your clear glass lamps. You should see the older ones glow, usually rather gently, with a yellowish green color. We suspect that the gentleness of the glow is due to the fact that only very small amounts of Manganese Dioxide needed to be added to the glass mixture to neutralize the iron impurities; however, it is also possible that Manganese Dioxide is just not that strongly fluorescent.

There is a second effect that this Manganese Dioxide has on clear glass. When glass with this compound is exposed to very short wave ultraviolet light (Ultraviolet "C"), it will, over time, turn purple. Slight purpling of clear glass due to prolonged exposure to sunlight (which contains UV "C" rays) can be quite attractive and appealing. However, unscrupulous glass dealers have taken to overexposing glass to strong sunlight (as in the desert Southwest) or to germicidal ultraviolet lamps (which emit UV "C" rays) to create artificially colored dark purple glass. Serious glass collectors consider this artificial sun-purpling to be a travesty.

Another form of Manganese, known as "trivalent Manganese" (because it forms three strong chemical bonds with other elements), such as Permanganate, has been used by glassmakers to create a true purple glass. Fluorescence is not seen in either artificially sun-purpled glass or in true purple glass created with the use of trivalent Manganese.

And yet another form of Manganese, this time known as "divalent Manganese" (forming two strong chemical bonds with other elements) has been used to add a yellow or brownish color to glass. When glass colored with this form of Manganese is viewed under "black" light, it will fluoresce with a bright orange color. As can be seen in some of the following photos, this effect can be quite striking.

A totally different element, Uranium, which has strong fluorescent properties has also been used as a coloring agent in glass making. A mosaic containing yellow glass found to have uranium content found in a Roman Villa near the Bay of Naples dates to 79 A.D. This is the first known use of Uranium as a glass coloring agent. It was in the 1830s, however, that the use of Uranium in åglass making became popular. The first major producer of both yellow glass and a yellow-green glass made with Uranium was Josef Reidel in Bohemia. Its use spread quickly throughout Europe and to the United States. As the use of Uranium in glass making spread, glass makers created a variety of different colors of both transparent and opaque glass by combining Uranium with other elements and coloring agents.

The most well-known Uranium glass is, like Reidel's early Uranium glass, yellow or yellow green in color. Sometime in the mid-twentieth century, people in the United States began calling this glass "Vaseline" glass because of its supposed similarity in appearance to Vaseline brand petroleum jelly. Most glass collectors in the United States seem to believe that "Vaseline" glass is any yellow or yellow-green glass (either transparent or satinized) which fluoresces a bright green when viewed under "black" light. There is also a light blue transparent glass (again, sometimes satinized, or frosted) of which a number of miniature lamps are made which also fluoresces a bright green when viewed under "black" light. This, too, is the effect of Uranium, in these cases used along with other elements, as a coloring agent. Some people call this glass "Vaseline" glass also although a number of purists insist that it should not be so labeled. They

Custard Leon's Ribbed or Lighthouse, S1-177 | Custard S1-297 | Jadite Paneled Cosmos, S1-241 | Custard Glass S2-404

Figure 4: Opaque Fluorescent Glass Lamps

Custard and Jadite

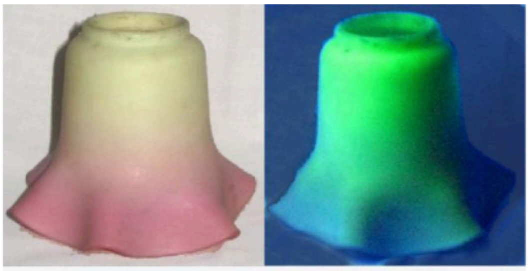
prefer to refer to it as "blue Uranium glass". Unfortunately, there is no formal, or officially sanctioned definition of "Vaseline" glass. In fact, there is no body, or organization with the power or authority to sanction any names or definitions of glass products. Thus the term "Vaseline" glass is used rather casually and sometimes cavalierly. In both Great Britain and Australia the term is used to describe any opalescent glass whether or not it contains Uranium or whether or not it fluoresces.

There are also some opaque glasses made with Uranium which fluoresce. The most well known of these is "custard" glass. Under normal light, the glass has an off-white, cream colored

appearance; sometimes the tint to the glass is on the yellowish side and sometimes on the greenish side. Glass makers achieve this opaque color by combining Uranium Oxide with Tin Oxide (Tin is generally used to make white milk glass). Not all cream or custard colored glass was made with Uranium and thus not all of it fluoresces. Once again, because there is no glass name sanctioning body, the term "custard" glass is often used somewhat casually. Thus some collectors use the term "true custard" glass to refer to this cream colored fluorescent glass. Fluorescent "custard" glass seems to have made its first appearance in England in about 1880 and migrated to the U.S. about 5 years later. Some opaque green glass will also fluoresce with an even brighter green color under "black" light.

This glass seems to be properly called "Jadite" (because of its jade-like color) although this term, like the term "custard" glass is often applied to any light green opaque glass.

Finally, the last type of fluorescent glass we'll discuss is "Burmese" glass. "Burmese" glass was patented by the Mount Washington Glass Company (New Bedford, Ma.) in 1885. It has a soft yellow color shading to a pale pink and is usually found in a satin finish (although glossy finish examples were also made). The color was created by using Uranium (which created the soft yellow color) and a solution of dissolved gold. When the glass, after an initial cooling, was reheated, the gold turned the reheated part of the glass to pink. Some "Burmese" glass is also decorated with hand-painted floral decorations. The story goes that the company presented a decorated teacup and saucer to Queen Victoria and that when she saw it, she said it reminded her of "a Burmese sunset"; thus the name "Burmese" glass. By 1886, Thomas Webb and Sons had licensed the formula for "Burmese" glass from Mount Washington and was making



Burmese Glass Shade

Figure 5: Fluorescent Burmese Glass

S2-453, Burmese Glass

items of it. Not all “Burmese” glass is old. Fenton, for example, has made many modern pieces of “Burmese” glass.

It is unlikely that early glass makers knew about the fluorescent effects of the various chemicals or elements they used in their glass. After all, for much of the period we’re talking about electricity was either unavailable or only available in limited capacities. Thus there would have been no “black” lights. The only method these pre- electricity glass makers would have had for generating ultra-violet light would have been to use a prism and it would have been tricky if not impossible to isolate the ultra-violet lamp from other ambient lighting in order to see its effects. We have read, however, that ultra-violet rays are stronger (or more prevalent) late in the day when the sun’s rays are low on the horizon. And so it is surmised that shop keepers who had Western facing windows might have found that some glass when displayed in those windows late in the day just might have had a bit of extra sparkle, or glow, due to fluorescence.

As mentioned earlier, while known to the Romans, Uranium was used as a coloring agent in glass beginning in Bohemia in about 1830. Its use in glass making continued until World War II when the U. S. and British governments, for obvious reasons, prohibited the use of Uranium in other than war-time endeavors. This ban was lifted sometime around 1960 and some manufacturers began using it in glassmaking again. However, at this point it was generally depleted Uranium which was use. Depleted Uranium still fluoresces but apparently not as strongly as un-depleted Uranium.

Since the quantities of Uranium used in glassmaking were small, even large collections of glass made with Uranium are not considered to be hazardous, emitting rather insignificant amounts of radiation.

One source we consulted claims that the only way to determine that a piece of glass was made with Uranium is to test it with a Geiger Counter. However, Geiger Counters are expensive and hard to come by. Other sources have said that if a piece of yellow, green or blue glass or a piece of custard colored or “Burmese” glass glows with a bright green fluorescence, it is reasonable to assume that it was made with Uranium.

So, turn off the lights, turn on the dark and with your black [magic] light, survey your lamps and bask in the glow.

A number of photos of fluorescence in night lamps, illustrating the types of fluorescence described in this article are on pages 5 & 6.

Editor's note: First thanks to Barry and Rick for a very comprehensive and informative article. I found an inexpensive black light at amazon.com and had a ball check out my lamps. Try it - you'll have a ball!