

GLASS AS A MATERIAL FOR BODY JEWELRY

COLORANTS IN GLASS

Coloring agents are added to the glass melt in the form of pure oxides and elements. Generally the amount of oxide used to color a glass batch is very small, under one percent of the volume by weight. You can imagine using a drop of food-dye to color a glass of water as an analogy. The same chemicals used to color soda-lime glass are used to color borosilicate glass. The reason there is not as much color availability in borosilicate glass is that some colorants cannot survive the high temperatures needed to heat borosilicate without boiling and pitting. Colorizing agents are modified into a stabilized matrix during the glass melting process. Particular elements can be identified by chemical analysis, but they no longer possess the properties of those elements or raw materials used in the glass production.

Glass colors can react to temperature changes (striking colors) and also to the type of flame chemistry being used to melt the glass (oxidizing or reducing flame environment). Glass chemistry and color can be compared to baking bread, using the same ingredients does not guarantee the same result. The method of mixing, the cycles of heating, and the type of oven are all factors in the finished color. Because of the nature of striking colors and the unpredictability of glass alchemy, consistency in some glass colors is challenging (red in particular). Since glass manufacturers use pre-formed glass in the form of colored rods and sheets to create jewelry, the quality and color of the raw material determines the quality of the finished jewelry.

GLASS AND LEACHING

After discussing glass colorants it is natural to address the concern of glass leaching, or better said the danger of ingredients leaching out of glass. Generally speaking glass is a relatively inert material, but it would be untrue to deny that leaching occurs. In fact leaching is an ordinary event and can be identified as a discoloration or dullness on the surface of the glass.

The Schott Guide to Glass describes the leaching process; “Leaching causes sodium and potassium ions to be dissolved from the glass structure. The concentration of hydrogen ions (pH value) is changed by the implantation of hydrogenous ions in the glass, water molecules infiltrate the glass while alkali ions go into the solution. A thin gel layer of low alkali and poor water content is formed, about 100 millionths of a millimeter thick. If that layer becomes thicker it becomes visible as dullness. Drinking glasses may show that appearance after several hundred cycles in the dish water.”

It is the sodium and potassium that leach out of the glass, in miniscule amounts and after multiple washing cycles over long periods of time. Some very unusual circumstances may accelerate leaching, such as autoclaving glass jewelry hundreds of times, and is not recommended. Stomach acids can cause leaching, glass should never be eaten. Acidic substances such as wine can also accelerate leaching. Under everyday circumstances and during the average lifetime of glass jewelry, leaching is negligible. Glass is widely used

in packaging food and beverages, cosmetics and perfumes, and in the pharmaceutical industry because of its chemical stability.

Leaching of metals and oxides are primarily an environmental concern, and pertains to the glass manufacturing and waste disposal. The gradual leaching of harmful elements into the ground water from the leaded glass from old television monitors in land fills is an example. This is a manufacturing and environmental concern and should not be confused by health concerns related to piercing jewelry. Glass leaching and exposure to unhealthy by products of glass is of the biggest concern to the glass artist who is exposed to glass powders and fumes released from the glass in the work environment.

CLEAR CASING

As an extra precaution colored glass can be clear cased, so that the colored glass never comes into contact with the skin. Clear casing glass serves two purposes, first it guarantees that colorants cannot leach out of the surface of the glass, second it prevents thermally sensitive colors (such as cadmium colors) from bubbling and pitting. The textured surface of colored glass that has boiled can leave dangerous sharp edges and leave pockets for bacteria to accumulate, therefore glass surfaces should be smooth without pitting.

Fuming 24k gold and pure silver can also be used to color glass. A small piece of silver or gold is heated on a torch, and as it vaporizes the metal leaves a coating on the surface of the hot glass held in close proximity. This coating needs to be encased with clear glass to protect the coating from being rubbed or scratched off. It is easy to identify fumed metals that have been clear cased. The clear casing creates a lens that adds a magnified effect and greater depth.