Gem Identification

Imitations
(Translucent to Opaque)
Glass and Plastic
Chalcedony, Jadeite, and Lapis
Pearls and other Organics

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HOTLINE FOR HELP

HOME STUDY STUDENTS: If you need help, contact your instructor. Call (800) 421-7250 toll-free nationwide, or (213) 829-2991; after hours you can leave a message. Subscribers can use GIA-NET.

IMITATIONS (TRANSLUCENT TO OPAQUE)

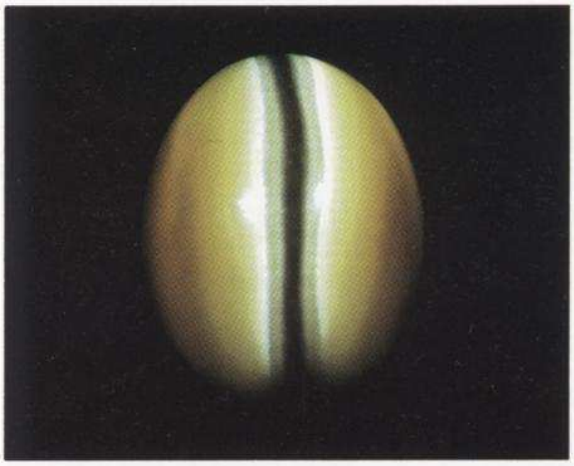
I. THE GREAT IMPOSTERS

Some of the world's most treasured gems—jadeite, pearls, and lapis lazuli, to name only a few—are translucent to opaque. Because of their value and popular appeal, glass and plastic imitations of such gems are common, so these are separations you will often need to make.

In this assignment you will learn how to separate a wide range of translucent and opaque materials from their imitations. These include chalcedony, coral, ivory, jadeite, lapis lazuli, pearls, shell, tortoise shell, and turquoise. Before we look at the separations, we need to look at the key imitators: glass and plastic.

Glass and plastic can be used to make sophisticated gem imitations.

Glass and plastic come in all colors and all degrees of transparency. They are often considered "cheap" materials, but they can be used to make sophisticated imitations. For example, the same fiber optic bundles used in medicine and science are also used in imitations of cat's-eye stones. Submicroscopic plastic spheres create a convincing play-of-color in some imitation opals.



This glass imitation cat's-eye is made of fiber optic material.

Glass and plastic seem to cause more confusion when they imitate translucent to opaque stones. The RIs and SGs of plastic and glass often overlap those of the materials they are imitating. Often either of these two properties alone is little or no help in the separation. Remember, though, that glass or plastic may have the same RI as the gem it imitates, or the same SG, but *very rarely both*.

Because of the nature of shell, coral, ivory, and tortoise shell, and the ways they are used in ornamentation, these materials are commonly imitated in plastic (more than in glass). But under magnification you can often see the characteristic structures of these materials.

PROPERTIES OF GLASS AND PLASTIC

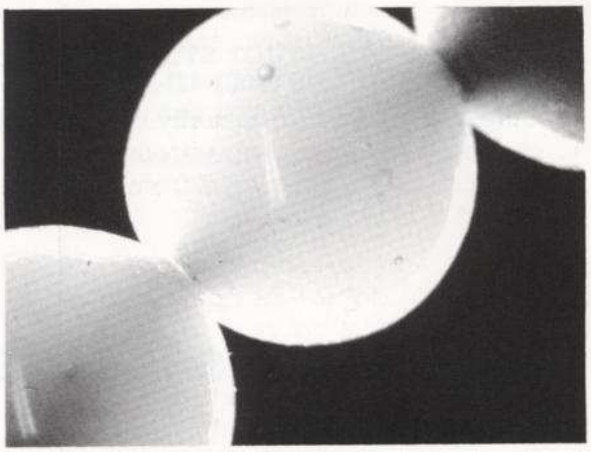
Although the RI of glass varies tremendously, the type used to imitate gemstones usually falls into the 1.48 to 1.70 range. Adding lead increases the RI beyond 1.70 (and also increases the brilliance, luster, and dispersion). Lead makes the mixture soft and brittle, though, so today it is rare to find a glass imitation with an RI over 1.70. Translucent glass sometimes gives an SR or ADR reaction in the polariscope, which can help separate it from the DR and AGG gem materials it imitates.

The SG of a glass imitation also depends on the amount of lead (or other additives), so the SGs of imitations vary widely. Low-lead glass usually has an SG around 2.20 to 2.30. High-lead glass can go as high as 8.00, but this would be much too soft to use in jewelry; 4.50 is about as high as you are likely to see.

Material is occasionally added to the glass melt to induce natural-looking inclusions, but these are usually accompanied by numerous gas bubbles. A swirling pattern of uneven color distribution is also characteristic. Fractures and chips are conchoidal, with vitreous luster. By contrast, aggregates like chalcedony, turquoise, and the jades (materials often imitated in glass) show waxy or dull fractures.

IN THIS ASSIGNMENT:

- **Translucent and opaque challenges.**
- **Glass and plastic: always possibilities.**
- **Chalcedony.**
- **Jadeite.**
- **Lapis lazuli.**
- **Pearls and other organics.**
- **Turquoise.**



It may take strong lighting to spot gas bubbles in translucent glass and plastic.

It is rare to find a glass imitation with an RI over 1.70.

Plastic is made from a wide variety of chemicals in an even wider variety of combinations. The RI of plastic ranges from 1.46 to 1.70 and is often between 1.50 and 1.60—thus overlapping the range of many gems it imitates. The SG is usually between 1.05 and 1.55.

A distinguishing characteristic of plastic is its odor when touched with a hotpoint; this is usually acrid, much like the smell of burning wiring under a car dashboard.

But it can also smell like camphor, fish, formaldehyde, sour milk, sweet fruit, carbolic acid, or vinegar.

Fractures in plastic are usually conchoidal to uneven, with a waxy to vitreous luster. Often this will distinguish it from the materials it is imitating.

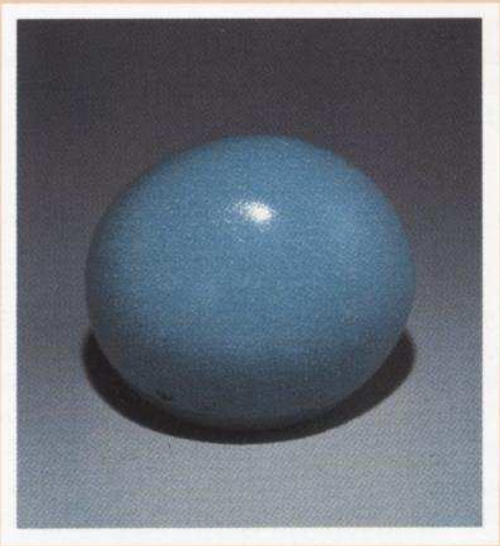
Both glass and plastic are amorphous in structure and do not dissipate heat as quickly as crystalline materials like jadeite and chalcedony, which they often imitate. They are warm to the touch, while the crystalline materials are cool. (This comparison is valid only if the two materials have been exposed to the same environment. Imitation jade beads just brought into a store on a chilly day will naturally be cooler than jadeite beads that have been under display lighting in the front window for a while.)

The key to identifying both glass and plastic is being aware that these two materials are *always* possibilities. Although they are often very convincing in appearance, and may have the same RI or SG as the material they are imitating, they will never duplicate all optical, physical, and chemical properties of the natural material.

When tested, this glass imitation of jade gives an RI spot reading of 1.62 (possible for nephrite, but too low for jadeite). Its SG is 3.38 (possible for jadeite, but too high for nephrite).

THE · COLLECTOR'S · BOX

Prosopite



First reported in 1853, prosopite (PROSS-oh-pite) was not, and generally is not, considered a gemstone. Colorless to grayish white and transparent to opaque, it shows no phenomena. It has a low hardness of 4.5.

Prosopite occurs in tin veins, alkalic pegmatites, and as an alteration product of topaz in volcanic rocks. It had long been known in Colorado, Utah, Germany, and Czechoslovakia, but in 1974, it excited interest in the world of gemology when samples of blue prosopite were reported found with azurite near Santa Rosa, Zacatecas, Mexico.

Blue prosopite is found in a massive form, and has the color and appearance of fine turquoise (the blue color is due to a 1.4 percent copper content). This makes it an effective and attractive turquoise imitation, but the two are easily distinguished, because turquoise has a higher RI (1.61. vs. prosopite's 1.50).

Here is a checklist, for the glasses and plastics typically used in imitations, of the properties that will come up most often in the separations discussed later:

Glass - RI 1.48 to 1.70; SG 2.30 to 4.50. Fracture: conchoidal with vitreous luster; polish luster, vitreous. Under magnification: gas bubbles common, occasional unevenly colored swirl marks, flow lines, hemispherical depressions where gas bubbles reached the surface.

Glass and plastic are always possibilities.

Plastic - RI 1.46 to 1.70, often between 1.50 and 1.60. SG about 1.05 to 1.55. Fracture: conchoidal to uneven with dull to vitreous luster. Under magnification: flow lines, gas bubbles. Hardness: 1½ to 3. Hot point: acrid or other characteristic odor (see above).

Almost all the separations discussed below involve either glass or plastic imitations. Rather than repeat their properties in each one, the descriptions will simply compare them to those of the material imitated. As you read through the descriptions, you can refer back to this section as needed, when a specific comparison comes up. (You will probably remember them after a while.)

Now let's look at separations involving imitations of translucent to opaque gem materials.

II. SEPARATIONS

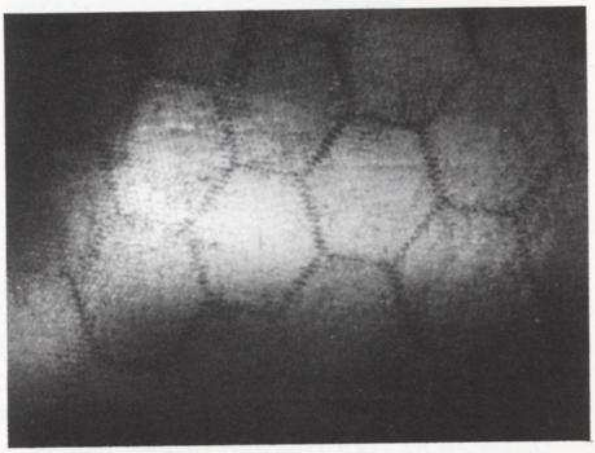
NOTE: Some key tests listed, including hot point, scratch hardness, and acids, are potentially destructive. (This is especially true with some of the materials focused on here, such as organics, plastics, and turquoise. For example, the hot point can leave burn marks on natural, synthetic, and plastic- and wax-treated turquoise, and can even ignite plastic.)

Never use such tests on GIA practice stones. Repeated testing—no matter how careful—would soon destroy them. The tests are listed here for completeness only. You will learn about appropriate uses in Assignment 35, but even in your own work, they always require extra caution. No separations on your questionnaire require destructive tests.

Cat's-eye Chrysoberly vs. Glass.
Key tests: Magnification, RI.

"Fire eye," "catseyete," "cacique," and "Cathay cat's-eye" are all trademarked names of glass materials that imitate natural cat's-eye chrysoberyl. They are often made in colors not seen in cat's-eye chrysoberyl.

Under magnification, cat's-eye may show silk and other natural inclusions. "Fire eye" contains long, parallel, tubular gas bubbles. The other chatoyant glass imitations are composed of long optical fibers bunched in hexagonal or square patterns. These show on the sides of the cabochon.



The hexagonal pattern of optical fibers seen under magnification on the sides of glass imitation cat's-eye.