

# Actual Exigencies Concerning the Quality of Amber Pieces Commercialized in Romania

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## Abstract

*The original amber has a special esthetic value and for that is more and more commercialized on market as jewelry, articles for gifts, souvenirs, art pieces and décor objects. The amber quality is the result of its aspect (especialyl natural inclusions), shape, color, gloss, dimensions, processing methods and others. The modern technologies have permitted to fake the amber with some materials. We present three methods of amber faking that allowed the commercializing of goods at lower prices. This paper also presents some fast easy tests that can be used to recognize the natural amber form the fake one. These fast tests can be applied even by non-specialists at commercializing goods for their protection.*

**Key words:** *original amber, fake, recognizing tests*

## Historical Outline

The naming of amber proceeds from the Persian ‘kek ruba’ that means ‘to attract the straw’ because it has a special property, to generate static electricity by friction. This property is an important criterion to recognize the original from the fakes (counterfeits).

The amber is a fossilized resin from some prehistoric pines. There were found out strings of beads and amulets made of amber from Paleolithic. Greeks valued it very much in Antiquity because they believed that the amber protected the human being who bear it against the rheumatism. A mixture composed of amber and oil or water was used to cure many diseases.

According to the legend, amber originates from the tears of the sea goddess Jurate and stones from her castle, which was destroyed by Perkunas, the god of thunder, when he discovered her passionate love affair with the mortal fisherman Kastytis.

Scientists, however, have a different story to tell: 40 to 50 million years ago, in the Eocene era, the earth’s atmosphere warmed, causing an increase in the secretion of resin in the pine forests of Fennoscandia, a land mass later swallowed by the Baltic Sea. The streams of resin swept down rivers into the sea, sometimes sweeping up a stray bug along the way. It is this fossilized resin that now sits in deltaic deposits in the Kaliningrad region (Russia), Poland, Sweden and Lithuania.

It is along the Neringa shores particularly that this ‘Baltic Gold’ can be found washed up upon the shore by the spring and autumn storms. Amber was considered so valuable that during the

times of Soviet occupation it was strictly forbidden to bring any out of the country. Ask any of the local fishermen; they will gladly tell you where the best finds are. If you would rather buy in minutes rather than search for hours check out some of the specialty shops listed below. Most of the art and handicrafts shops sell amber also. Happily, there are no longer export restrictions.

Ask most people and they will tell you that amber is a dark honey color. However, visit the marketplace, especially the stalls on Pilies gate and you will soon find out that amber comes in such diverse colors as blue, black, white and yellow. The white one is called king's amber and is widely available in Lithuania while the blue and black one is rare here.

The beauty of natural amber has led to counterfeits that are known as 'artificial amber'. In the middle of the 19<sup>th</sup> century, scientists discovered ways to synthesize the precious substances. Due to the high demand and the price amber commanded in those days, additional experiments and efforts to falsify amber picked up pace and eventually the Baltic amber also fell prey to falsification.

People found various ways to imitate amber using plastic (most common), copal (pre-amber tree resin substance), glass and other types of resin. These processed substances have come close to amber and made it possible to fool naked eyes. Falsification of amber inclusions is widespread since inclusions in amber are rare to find and command good prices in the international market.

As regards this aspect, the synthetic amber produced in Austria before 1940, can hardly be distinguished, from the original one. Since then the number of imitations has increased both quantitatively and qualitatively. Sometimes, it is very difficult to distinguishing, as aspect, the original amber from the fake amber.

## **The Commodity Characterization of Amber**

Amber is a fossilized amorphous mineral. It is fragile and breakable. The most known deposits are concentrated at Baltic Sea on an area with 2000 km length and 500 km breadth. It can be found in Poland (kopalit), Germany, Denmark, China (retinite), Canada (cedarite), Patagonia (ambrite), Spain (red retinite), Hungary (ajkait), Romania (roumanite), Italy (Sicilian amber or simenite), Dominican Republic (blue amber) and other places. The amber proceeds from the *Dammara orientalis* tree resin. It has formed recently in Tanzania, Mozambique and Madagascar.

Out of all amber handiwork the Amber Room is famous. It was made in Prussia between 1701-1709 and given to Tsar Peter the Great in 1716. It was brought at Tarscoe Selo in 1755 and moved at Kaliningrad during World War II, when we lost trace of it.

The amber color is an important characteristic for its identification because it very much affects its esthetic value. For this reason there are museums that exhibit these specimens. In the Amber Museum in Gdansk (Poland) are presented the nativity and processing methods of such specimens. In Romania there is an Amber Museum in Colti village (Mehedinti district) where amber specimens from Buzau (roumanite) are exhibited. These are characterized by a high fluorescence and are more valuable than the Gdansk collection.

## **Ways of Faking Amber**

Fake amber is not hard to make. It can be made by heating colored plastic, copal (not 'mature' amber) or other modern polymers. Quality specimens run into hundreds and even thousands of dollars. It is not particularly easy to identify fake amber from original amber.

On the amber market there are many fake specimens. The main directions for these falsification procedures are:

- amber falsification with cheaper natural resins such as copal or common resin;
- amber falsification with imitations;
- amber falsification with ambroid, i. e. reconstituted amber.

The main quality characteristics of amber are presented in table 1.

**Table 1.** The main properties of the amber

No.	Qualitative characteristics	Characterization
1.	Color	Yellow as honey, orange, light yellow, red-hyacinth (red zirconium), rarely blue, greenish, black
2.	Transparency	Transparent to translucent, opaque
3.	Aspect	Equable aspect; sometimes with small preserved vermin, leafage, and grit inside. These inclusions are a criterion of identifying fake amber.
4.	Gloss	Oily, mat
5.	Specific weight, g/cm <sup>3</sup>	1,05-1,096
6.	Luminescence	Bluish, yellowish
7.	Breakage	Shell-shaped
8.	Hardness on mineralogical scale of Mohs	2-2,5; friable
9.	Electrical properties	It charges with static electricity
10.	Treatment	It warms in oil and it is warm pressed
11.	Processing	Cabochon, beads, sculpture and glyptic, rarely it is faceted

## The Amber Falsification with Copal

First, one must understand that amber is the fossilized resin from ancient trees. Millions of years ago, in the Baltic area, either pine trees or eucalyptus (gum) trees probably produced the resin that turned into amber. Resin from either of these types of trees, when placed in proper conditions, turns into amber. There is an intermediate stage where the resin might look like amber, but is not changed enough (polymerized) to be considered real amber. This 'young' resin is called copal. Copal is always much younger than amber and has some characteristics which distinguish it from real amber. For instance, copal is generally less dense than amber. Density is measured in what we call specific gravity. Regular amber often has a specific gravity of 1.05 to 1.10 (where 1 is the same as water's). Copal looks similar, but has a lower specific gravity of 1.03 to 1.08. A specific gravity of above 1.0 will cause the object to sink in fresh water. While amber and copal will both sink in regular water, salty water has a higher density. Amber and copal will both float in salty water. Roughly 15 grams of salt in 100 ml of water (4 teaspoons of salt to 8 ounces of water) will approximate salty water. In this solution, both amber and copal should float. Copal is usually lighter than a similar volume of amber. Unless you are very familiar with the weight of amber, do not trust your estimate of the weight.

The fast tests for the recognition of real amber from copal are presented in the table number 2.

**Table 2.** Fast tests for the identification of the real amber from copal

No.	Test	The characterization of recognition
1.	Burning test	Amber burns a black smoke and does not melt. It will burn away like incense. After heating natural amber diffuses the specific delicate fragrance of pine-tree resins. Copal will burn with a whitish smoke and will melt, as incense. Copal melts at a rather a low temperature (lower than 150°C) and tends to melt rather than burn. After heating it diffuses the 'sweet' smell of burning resins.

2.	Smell test	Copal comes close to amber because chemically they are close. Copal is actually a very young tree resin and contains succinic acid or succinite. Resin flows like syrup and has a distinct piney, sweet smell. The piney, sweet smell is due to chemicals in the substance known as terpenes. Immature amber or copal is a substance in which all the volatile terpenes have not yet left the resin. Copal imitation is generally used to imitate amber inclusions by inserting insects into them. Real amber has a piney smell (or burnt resinous smell).
3.	Acetone test	Copal (immature resin) does not hold up to solvents. Take a few drops of acetone (fingernail polish remover) or alcohol and drip it over the surface of the piece. If the surface becomes tacky, or the fluid takes on the honey golden color of substance you can see that it is not amber. Amber is not harmed and will not dissolve under these solvents. Copal is slightly soluble (has not hardened enough over the millions of years) in acetone, so the surface will get sticky. Regular amber is not soluble and therefore acetone should not do anything to it. Difficulty does arise when the creator of fake amber will drill out the center of the amber piece, insert a modern insect and then fill the hole with hot copal. The resulting piece is very hard to distinguish from the real thing. If the light is clear, it is possible to see the original drilled hole. Identification of an extinct species of insects is difficult because 'old' and 'new' insects all look the same to the untrained eye.

### The Amber Falsification with Imitations

The beautiful aspect of amber encourages the use of more and more imitations made of all kind of substances even plastic or glass (table 3).

**Table 3.** The main substances used for faking amber

No.	Substance	Characterization
1.	Phenolic resin	This chemical substance is used to produce amber beads and is useful in obtaining various colors of amber such as dark red, cloudy yellow, limpid. It is also useful in obtaining exact amber bead shapes (oval, round etc.) giving a sense of better carving or polishing.
2.	Celluloid	Celluloid (cellulose nitrate) is usually yellow and cloudy. It is optically difficult to distinguish it from amber. Celluloid is more solid and not so combustible.
3.	Casein	This is a plastic made of milk. The beads have cloudy, turbid yellow color. It is a little bit heavier than amber. After heating it diffuses the smell of burnt plastic.
4.	Polyester, polystyrene	These modern plastics are used for producing artificial amber and inclusions. Optically this substitute can hardly be distinguished because with it authentic amber colors and limpidity can be obtained. As in the case of copal, falsified inclusions are too big (more than 10 mm) and clearly seen, inserted in the very center of plastics. After heating it diffuses the smell of burnt plastics.
5.	Glass	Although the glass imitation of amber can sometimes achieve the look, it is not a smart falsification. It is easy to detect.

For the recognition of fake amber from the authentic one fast tests are used. They can be used even by non specialized people.

**Table 4.** The main tests to recognize the authentic amber

No.	Name of the test	The characterization of the recognition
1.	Sensorial analysis	The magnifying glass is used with 10 fold aggrandizement. The amber transparency can vary from transparent to translucent or even opaque. The gloss is oily, mat. We can observe the processing method because the natural amber is processed as cabochon, beads and other forms and rarely appear to be faceted. The fake amber can have these characteristics at lower parameters for the final piece because they are specific only to the amber.
2.	'Hot needle' test	It is a fair good test to identify the fake amber. This test consists in the introduction of a hot needle inside the amber pieces. Real amber has a piney smell (or burnt resinous smell) and fake amber can have an electrical, plastic or sweet smell. However, this test destroys the amber piece.
3.	Burning test	Amber burns with a black smoke like incense and does not melt; plastic imitations can also burn with a black smoke but they will melt. The burning test involves the destroying of the amber piece, too.
4.	Smell test	Smell tests are the most effective because natural amber has a specific smell, which is difficult to obtain when producing falsifications. Amber smells sweet, piney and pleasant when burnt, that is why it has been used for centuries.
5.	Aspect of the breakage	Raw amber, when broken, has conchoidal fracture. This means it looks similar to chipped glass. A chipped piece of glass will often show concentric circles in the chipped area - this is conchoidal fracture. Amber does not have to chip in this way, but will often exhibit the fracture cut type.
6.	'Rubbing' test	It is easy to distinguish glass from amber: it is more solid and cannot be scratched by metal. Glass is cold and fireproof. The 'rubbing' test consists in rubbing the fake amber into the hands until it releases the smell of pine-tree resins.
7.	Salty water test	Real amber floats in salty water. That is why it is easy for locals on the Baltic Coast to find it washed up on beaches, especially after storm events. The test uses 7-8 spoonfuls of salt into 300 ml of water. After several minutes of stirring the salt will dissolve. Carry out the test and wash the sample with pure water. The test has a deficiency: it will not detect polystyrene and copal and jewelry (with metal, strings of beads and clasps make the piece sink).
8.	Acetone test	The authentic amber is not soluble in acetone so it is not influenced by introduction into this solvent. The fake made of plastic is affected by acetone that dissolves the outer layer which can sometimes be a shellac coating. This is probably one of the easiest tests. The test is easy to be used for goods or some articles.

In some cases lab tests can be used too. They need precision devices and specialized personnel. In table 5 are presented some lab methods of identifying authentic amber from the fake one.

**Table 5.** Amber recognition by lab tests

No.	Analyzed tests	Characterization
1.	Fluorescent test	Amber is fluorescent. That is, when ultraviolet light (UV) is directed onto amber, it will be fluorescent. Common fluorescent colors are yellow, blue, green and orange. The intensity of fluorescence can be different with different types of amber. This is a simple test but it needs a black light. It consists in directing the black light onto sample and observing the 'shine'.

2.	Refractive index test	Authentic amber has a refractive index of 1,5 to 1,6 while plastic and other chemicals used for faking amber will give a very different refractive index. The refractive index is a measure of how light is refracted when it goes through amber. This test needs a refract meter (a gemological instrument).
3.	Hard test	Amber is not hard, when using the Mohs' scale. It usually ranks from 2 to 2,5. Your fingernail is about 2 and thus it is very difficult to scratch amber. An American penny has a hardness of 3,0 and should scratch amber. Steel having a hardness of 5,5, when scraped on amber produces powder or very fine granules. If the piece is plastic, shavings are likely to result.

### The Amber Falsification with Ambroid

The ambroid is reconstituted amber. It is obtained from small remains of amber or a mixture with amber dust resulted from processing activities and then it is pressed.

The recognition method concerns to the sensorial analysis because the ambroid is similar in aspect to real amber. In the ambroid structure one can observe small air inclusion.

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## Exigențe actuale privind calitatea produselor din chihlimbar comercializate în România

### Rezumat

*Chihlimbarul natural are o valoare estetică deosebită, de aceea este tot mai mult comercializat pe piață sub formă de bijuterii, articole pentru cadouri, amintiri, obiecte de artă, articole pentru decor interior etc. Calitatea lui este dată de aspect (în special de incluziunile naturale), formă, culoare, luciu, mărime, mod de prelucrare ș.a. Tehnologiile moderne au permis falsificarea chihlimbarului natural cu chihlimbar falsificat. Sunt prezentate trei posibilități de contrafacere care permit și comercializarea produselor la prețuri foarte scăzute. În lucrare se mai prezintă și metode rapide și ușoare care pot fi utilizate pentru recunoașterea calității chihlimbarului natural față de cel contrafăcut. Aceste metode rapide pot fi aplicate chiar de către nespecialiști la achiziționarea produselor, asigurând protecția lor.*