Carbonado
Totally Explained

Carbonado is a natural polycrystalline diamond found in alluvial deposits in the Central African Republic and Brazil. This diamond looks black and is highly porous. Unlike other natural polycrystalline diamonds, carbonado has no mantle-derived inclusions and its carbon isotope value is very low. Additionally, carbonado exhibits strong luminescence (photoluminescence and cathodoluminescence) induced by nitrogen and by vacancies existing in the crystal lattice. Analysis of the luminescence suggests that radioactive inclusions existed in the formation process of carbonado.

U.S. geologists have discovered the origin of these rare and mysterious black diamonds: interstellar space. A team from Florida International University and Case Western Reserve University used the infrared radiation from the synchrotron at Brookhaven National Laboratory in order to come to their conclusion. They have found that black diamonds contain trace elements of nitrogen and hydrogen which they claim are sure indicators of an extraterrestrial origin. They have also hypothesized that these diamonds were created in stellar supernovae explosions and were the size of asteroids when they collided with the earth.

An analysis in 2006 indicates these diamonds formed in a hydrogen-rich interstellar environment, that is, outside the Solar System, or before the formation of the planets. In this sense, these diamonds are akin to carbon-rich cosmic dust, likely having formed in an environment near carbon stars. The diamonds were incorporated into solid bodies that subsequently fell to Earth as meteorites.

A more recent study by Stephen Haggerty and Jozsef Garai, both of Florida International University, analyzed the hydrogen in black diamond samples using infrared-detection instruments at the Brookhaven National Laboratory and found that the quantity indicated that the mineral formed in a supernova explosion. Their research was published in the journal Astrophysical Journal Letters.

Early theories on origin

The origin of carbonado was controversial, with several hypotheses proposed:

1. *Direct conversion of organic carbon under high-pressure conditions (the Earth's interior.)* The problem with this hypothesis was that, were carbonado formed by phase transformation of organic graphite inside the Earth, carbonado would be found all over the world. However, carbonado appears only in the Central African Republic and Brazil.
2. *Shock metamorphism induced by meteoritic impact at the Earth's surface.* The problem with this hypothesis was that, shock-induced natural polycrystalline diamonds usually have hexagonal diamond (lonsdaleite) inside the samples and the presence of hexagonal diamond inside carbonado hadn't been reported.
3. *Radiation-induced diamond formation by spontaneous fission of uranium and thorium.* The problem with this hypothesis was that, the energy of radiogenic fission is too small to create polycrystalline diamond of the large grain size of carbonado (up to 500 micrometers). These diamonds are currently being used in various designs and settings in the jewelry industry.