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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.

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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 had not 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.

Extraterrestrial origin

A team of U.S. geologists have published evidence relating to the origin of these black diamonds: interstellar space. They have found that black diamonds contain trace elements of nitrogen and hydrogen which they claim are sure indicators of an extraterrestrial origin. The study published in 2006 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 prior to the formation of the [Solar System](#). 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.^[1]

See also