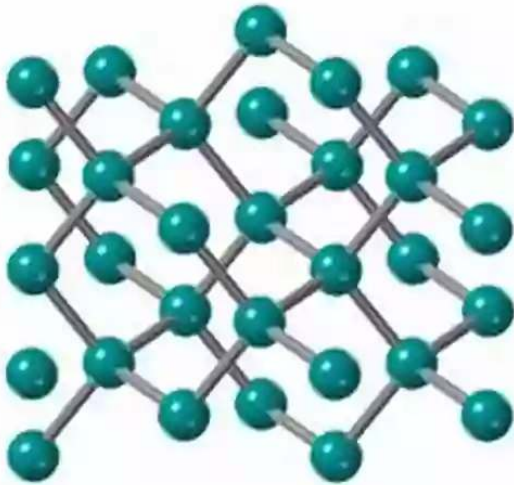
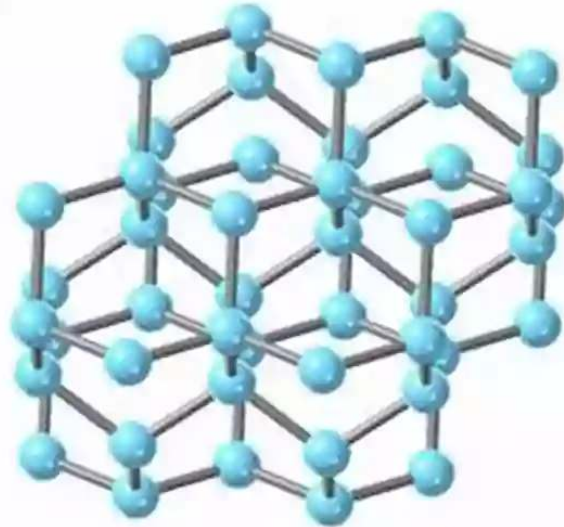


What Are Diamonds And How Do They Form In Depth Science



Cubic Diamond

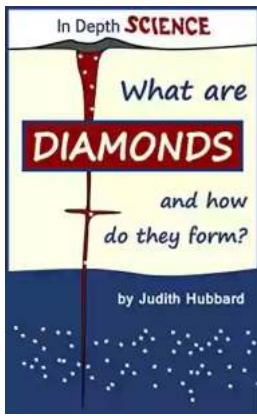


Hexagonal Lonsdaleite

Diamonds have long captivated humanity's fascination and desire. These mesmerizing jewels, known for their unparalleled beauty and value, are the result of intricate processes that occur deep within the Earth's mantle. In this in-depth scientific exploration, we will unravel the secrets behind the formation of diamonds, detailing the complex journey these exceptional gemstones undertake before ending up in their coveted state.

Understanding the Basics: What Are Diamonds?

Diamonds are natural minerals composed of carbon atoms arranged in a crystal lattice structure. They are renowned for their exceptional hardness, thermal conductivity, and optical properties. Their formation is closely linked to the geological processes that take place deep beneath the Earth's surface, involving immense pressure and temperature conditions.



What are diamonds, and how do they form? (In Depth Science Book 1) by Judith Hubbard (Kindle Edition)

★★★★☆ 4 out of 5

Language	: English
File size	: 4803 KB
Text-to-Speech	: Enabled
Enhanced typesetting	: Enabled
X-Ray for textbooks	: Enabled
Word Wise	: Enabled
Print length	: 83 pages
Lending	: Enabled
Screen Reader	: Supported



The Geological Journey of Diamond Formation

To comprehend the formation of diamonds, we must delve into the depths of the Earth's mantle. Diamonds are born around 150 to 200 kilometers beneath the surface, in the upper mantle. This region, referred to as the "diamond stability zone," offers the ideal conditions for diamond formation.

At such depths, the Earth's mantle experiences extreme heat and pressure. Carbon-rich rocks, particularly those containing the mineral known as "peridotite," become the starting point for diamond creation. These rocks are subjected to temperatures ranging from 900 to 1,300 degrees Celsius and pressures exceeding 725,000 pounds per square inch (50 kilobars).

Under such unfathomable conditions, carbon atoms break free from their bonds within the peridotite rocks and undergo a process called "graphitization." This transformation occurs as carbon atoms rearrange themselves, forming graphite, a crystalline form of carbon known for its opaque, flaky nature.

Diamonds Emerge: The Transformation From Graphite

While graphite may seem similar to diamonds in terms of chemical composition, it lacks the crystal lattice structure that gives diamonds their incredible hardness and optical properties. However, something extraordinary occurs deep in the Earth that drives the transformation of graphite into diamonds.

Throughout the mantle, volcanic activity creates conduits for transporting materials to the Earth's surface. These channels, known as "kimberlite pipes" or "lamproite pipes," act as highways for diamonds, carrying them closer to reach the crust of the Earth.

As the magma in these pipes rapidly ascends towards the surface, it picks up diamond crystals along the way. This eruption, known as a volcanic explosive event, occurs due to the release of immense pressure. The volcanic explosion acts as a catalyst for the rapid ascent of diamonds, uplifting them from the depths of the Earth in a violent and awe-inspiring spectacle.

From Crust to Market: The Journey Continues

Once diamonds reach the Earth's crust, they are scattered within the erupted material. They can be found in what are known as "kimberlite or lamproite indicator minerals." These minerals, such as garnets and peridots, indicate the presence of diamonds.

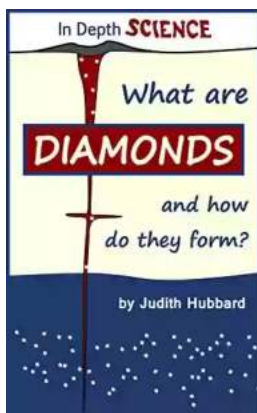
Exploratory diamond mining operations are often based on detecting these indicator minerals. Utilizing specialized techniques, such as analyzing soil samples and geophysical surveys, geologists can identify potential diamond deposits. Once a deposit is confirmed, various processes, including open-pit or underground mining, are employed to extract diamonds from the Earth.

Following the extraction, diamonds undergo a meticulous sorting and grading process. Professionals with expertise in gemology assess their quality based on various factors, including color, clarity, cut, and carat weight. Only the finest gems meet the stringent criteria required to become highly sought-after, precious diamonds.

The Enduring Allure of Diamonds

Throughout history, diamonds have been treasured for their rarity, beauty, and symbolic meaning. They possess a timeless allure that continues to captivate people around the world. Whether adorning engagement rings, enhancing formal attire, or simply being cherished as valuable heirlooms, diamonds hold a special place in the hearts of many.

Understanding the scientific processes behind diamond formation allows us to appreciate the immense journey these precious gemstones undertake. From the depths of the Earth's mantle to the sparkle on a finger, diamonds embody the fascinating relationship between geology, chemistry, and our admiration for the extraordinary.



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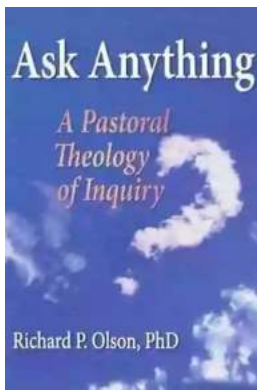
Have you ever seen a diamond? Have you ever wondered where it came from?

The story of how diamonds form will take you on a tour of the Earth. Zoom in to the atomic scale to see how atoms bond, dive into the Earth's mantle to explore temperature and pressure, and get carried back up to the surface in a special volcanic eruption.

Real, cutting-edge science, written for kids!

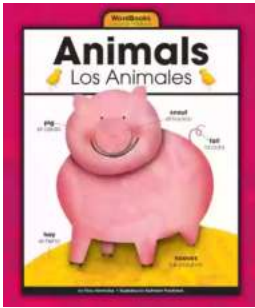
The text is supplemented with fascinating illustrations and photographs, a self-quiz to test your new knowledge, hands-on activities, and a glossary.

Judith Hubbard is a geology professor with a PhD from Harvard University and a BS from Caltech - and also three young children, who are always exploring the world as natural scientists



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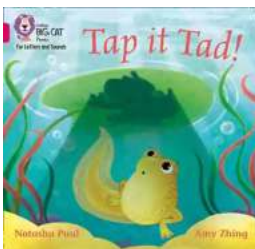
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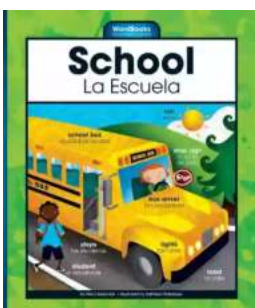
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