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Differences and similarities between diamond and graphite

Completely different, but the same is about [graphite](#) and [diamond](#). Their comparison helps to understand the whole originality of the situation with these two substances.

**Myths and misconceptions about diamond and graphite**

For a long time it was believed that different from each other, diamond and graphite – is a different matter. In 1797, chemist S. Tennant conducted a series of experiments in which he compared the composition, proving that they are based on carbon.

When comparing the structures of diamond and graphite at the atomic level revealed a significant difference:

1. The diamond has a crystal lattice in the form of a tetrahedron, where each atom is surrounded by 4 other atoms, being the top of the neighboring tetrahedron. They are like a honeycomb, only in 3D. Such a structure provides a strong link between the molecules of a substance.
2. Graphite is also represented by hexagons, but they are located in horizontal layers between which no strong ties. This makes it soft and pliable.

Properties of diamond and graphite depend on the structure of the crystal lattice, because radically different, they have in common is the ability to conduct heat, the heat at the same time. If we make a comparison of the other indicators, they differ:

- graphite leaves a greasy mark on the paper, diamond – no;
- the gem is represented by different colours, unlike its "brother" – one;
- crystal – standard hardness, while the second carbon material crumbles at the slightest touch;
- areas of use are different.

**Physical and chemical properties of minerals**

Chemical formula of diamond and graphite single – a carbon, designated in the contaminated by magnesium, iron, nitrogen, aluminium, which gives it color.

The type of the crystal lattice of the diamond cubic, graphite – hexagonal. This explains the fact that the hardness of diamond is 5 times bigger than his "brother".

The structure of the diamond is two – fold- a mineral is hard but brittle. Of graphite, consisting of scales, it's flaky. Comparison of the structure gives the answer about the difference of the optical properties of the first channels light and the other is not.

periodic table as C. the gem that has been

The comparison of the physical properties of diamond and graphite is presented in the table:

Criterion	Diamond	Graphite
The crystal lattice	<u>Cubic</u>	Flat
Transparency	Transparent, translucent, rarely muddy	Opaque
Conductivity	Missing	Good
The thermal conductivity	Present	Present

Melting point	4000 °C	3890 °C
Color	Colorless, blue, white, yellow, etc	Grey
Density	3,56 kg/ m <sup>3</sup>	2.23 kg/ m <sup>3</sup>
Aggregate state	Solid	Solid
<u>Hardness on the Mohs scale</u>	10	2

### Applications of carbon minerals

Carbon minerals have a wide range of properties allowing to apply them in different areas of life. You can meet them in the ring, the pencil, a tool for cutting metal, and glass. If a comparison of areas of application, we can see that they intersect only in one point – the transmutation.

#### ***Diamond***

The main applications of minerals – jewelry making. In the process, the stone becomes a diamond, finding the high price. The second role of the gem – material.

Not always a perfect gem in color and transparency. Meet muddy samples, in jewelry processing remain small fragments that are impossible to adapt for inlay jewelry. They are used in precision instruments:

- electrical engineering;
- electronics;
- the glass cutters;
- power electronics;
- rigs.

#### ***Graphite***

Main uses:

- fire-resistant equipment;
- lubricants;
- pencil leads;
- neutron moderator in nuclear energy;
- the creation of artificial diamonds.

A diamond can only be used as a solid crystal, graphite – like a fat paste and a solid object.

### Comparative characteristics of diamond and graphite

Analysis of the characteristics:

1. Comparison of the crystal and the graphite from the point of view of inorganic chemistry indicates that they are the same. Carbon is the basis of the composition.
2. Comparison at the molecular level helps to understand the reason for such difference in properties. The arrangement of atoms and connections between them makes the same different.
3. Physical properties vary dramatically, in addition to the ability to conduct heat.
4. Comparison of applications suggests that they are used based on the structure of the crystal lattice, and not chemical composition.

Comparison of composition, structure, and application of two different substances shows how similar can possess polar characteristics and properties.