

Diamond Crystals

Beauty in its natural state - no cosmetic surgery!

Diamond is the hardest of all gemstones, and yet most of us are only familiar with diamonds as faceted stones. How is that possible? And what do diamonds look like before they are cut?

Diamonds are composed entirely of carbon atoms, the same as much softer graphite. The difference is in how the carbon atoms are arranged. In graphite, the atoms form strong bonds in layers, which can easily slip. But in diamond the strong bonds form in all directions resulting in an extremely hard substance. The most common diamond crystals are cubes with six square faces, octahedrons with eight triangular faces, and dodecahedrons with twelve faces. While most rough diamonds are based on one of these three crystal forms, they are very seldom perfectly formed. As conditions change while the crystals are growing, it is common for the growth pattern to change and to have distortion of the theoretical shape. Areas where the crystal faces mound outward, or are etched inward also occur. The etching of octahedrons is usually in the form of triangles known as trigons. These trigons are always turned 180 degrees to the triangular face they occur on.

Some crystals consist of two separate parts joined with a common atomic plane. These are called twin crystals, and the most common type is called a macle. Remember that octahedrons have

1.29 carat natural yellow diamond macle in white gold \$3750

1.00ctw natural diamond cubes in 22KT and sterling \$900

1.18 carat natural diamond crystal in yellow gold \$1990

3.74ctw natural diamond crystals in 22KT and sterling silver anticlastic spiculum bracelet \$2970

triangular faces? A macle starts out as an octahedron, but early in its growth, part of the crystal starts growing in a different direction. The second part of the macle is always either 60 or 180 degrees twisted from the first so that the end result is a flattened crystal with two parallel triangular faces. Usually these diamonds are cut into

fancy shapes like trilliants, but they also look fantastic as natural rough crystals.

Now that we know a little about diamond crystals, let's find out how they are cut. When we cut and polish other gemstones, we can use diamond as the abrasive. Since it is a harder substance, it is able to act quickly and efficiently on the gem material. When working on diamonds, we can only cut and polish them with other diamonds. The secret is that the hardness varies depending on the crystal orientation. Remember how graphite was soft because the atoms only bonded in one plane? All diamond crystals, regardless of their shape, contain octahedral, dodecahedral, and cubic planes. Cubic planes are softer than octahedral planes, and are the plane most often used for cutting. Dodecahedral planes are the softest, but not as useful for weight retention. When polishing diamonds, the polishing grit is made up of diamonds randomly oriented so some will be presenting a hard plane and others a soft plane. By changing the orientation of the diamond being held for cutting, we can present the softest direction possible to maximize the effectiveness of the cutting lap.

Macles are a particularly difficult crystal form to cut and polish. Those parallel triangular faces are in the octahedral plane, so are very hard. The best weight retention in a macle is obtained by cutting a trilliant with the table parallel to the triangular face. Since that is also the hardest plane, cutting and polishing is extremely time consuming. Fortunately for us, uncut macles make great natural diamond crystal jewelry. The flattened shapes are easy to securely set into rings and the big triangular faces are usually blessed with an abundance of trigons adding visual interest and an indication of authenticity.

