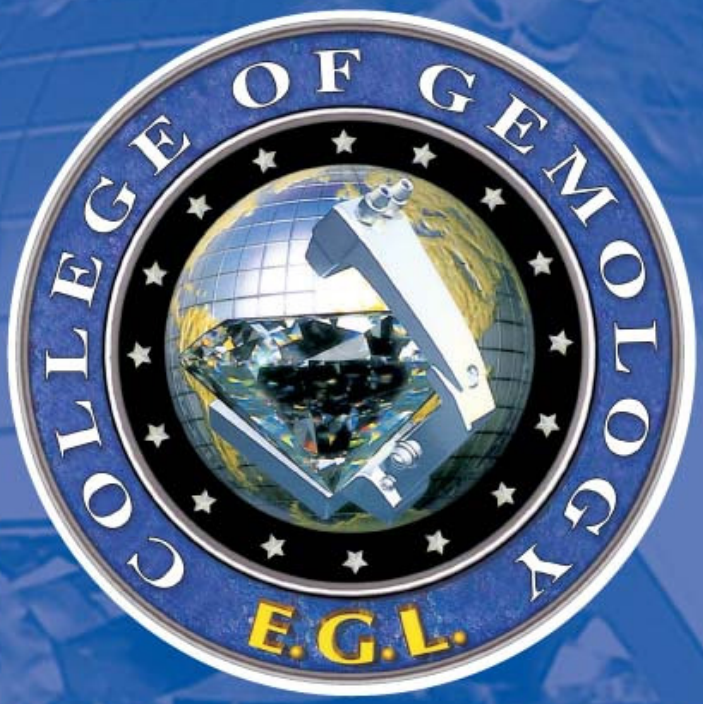

E.G.L. COLLEGE OF GEMOLOGY

SOUTH AFRICA

DIAMONDS AND DIAMOND GRADING

1. WHY A DIAMOND IS CONSIDERED IN A CLASS BY ITSELF

A diamond is a gem that is composed of almost pure carbon. A diamond crystallises in the crystal system of highest symmetry: “the cubic system”. Graphite is the only other crystalline form of carbon. Diamond possesses hardness far surpassing that of any other substance known in nature. It has a very high degree of transparency, refractivity and “fire” (dispersion). These aspects contribute to the high degree of brilliancy and display of prismatic colours found in a diamond.

2. DIAMOND CRYSTALOGRAPHY

You already know that diamond is an extremely pure form of carbon. All crystalline materials develop in patterns of one of the seven great crystal systems found in nature. Of these, the cubic, or isometric system, is the most symmetrical. It is to this system that the diamond belongs. During the formation of some of the crystals, minute quantities of other elements (between 0.02 – 0.05%) such as nitrogen and boron were absorbed into the crystal. It is elements such as these, which influence the colour, fluorescence and electrical conductivity of a particular stone.

The carbon atom in diamond links by covalent bonding. Covalent bonding is very strong and is responsible for the hardness of diamond and its high melting point which is 3,700^{o} C. It is the hardness and high melting point, that makes diamond suitable for the tipping of drills and use in high precision instruments.

There are many possible crystal forms within the cubic system. Diamonds’ most common crystal form is the ***octahedron*** (meaning 8 faces). The octahedron is an eight sided figure shaped like two pyramids joined at the base and in theory each of the eight sides, is an equilateral triangle. Because it is made by nature however, octaherdral rough is seldom perfectly shaped. Another common form of diamond is the ***trisoctrahedron*** (meaning 3 times 8 faces). An octahedron in which of the eight faces has been replaced by six triangular faces is called a ***hexoctahedron*** (meaning 6 times 8 faces). This variation is common and can have a somewhat rounded outline. The cube is quite usual in industrial quality diamond which the ***dodecahedron*** (meaning 2 plus 10 faces) has twelve rhomb shaped faces. *(See illustration 1).*

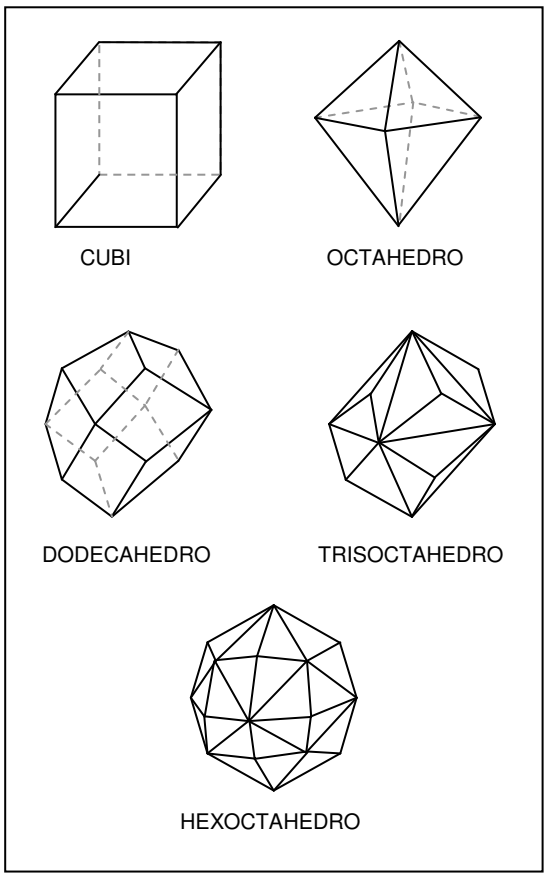

Illustration 1 – Common Shapes of Diamond Crystals

REMEMBER THAT PERFECT CRYSTAL FORMS LIKE THOSE ILLUSTRATED ARE RARE AND ARE COMMONLY FLATTENED, ELONGATED OR ROUNDED. (See illustration 3).

It is common for trigons to appear on the face of an octahedron. Trigons are triangles that are on the surface of the stone or marginally sunk into the face of the octahedron. *(See illustration 2).* The trigons are useful in that they can be used as an identifying characteristic and by the cutter to determine the direction of the grain of a stone. Simulants and synthetics do not have trigons.

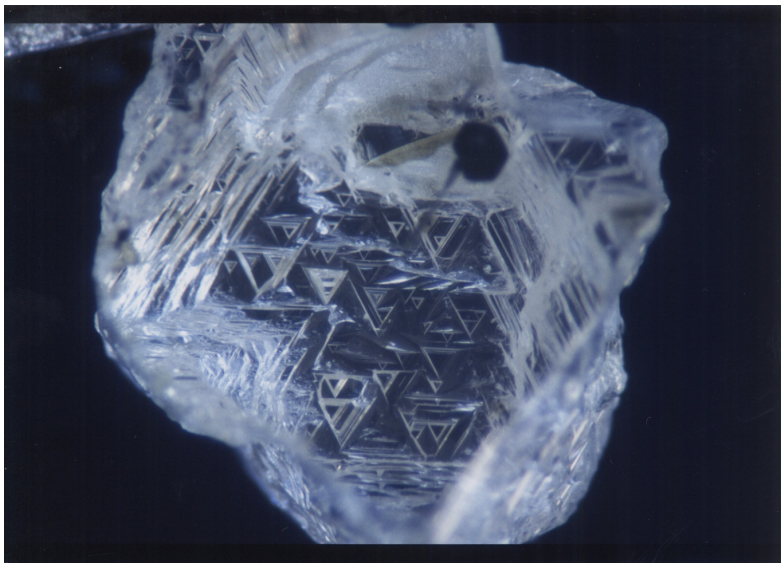

Illustration 2 - Trigons
By courtesy of American Institute of Diamond Cutting, Inc.

Illustration 3 - Shapes of Diamond
Courtesy of De Beers