The corundum

This is a *"allocromatic*" mineral , that appears in all colors. The color depends on impurities, but it does not alter its chemical composition
Corundum is an oxide of aluminum (or rather a bialluminum trioxide) Al_2O_3, just as alumina. But crystallized in different shapes.
The corundum, in its most valuable qualities, is a precious stone that takes on different names depending on the color.
The main gemological varieties are:

- *Ruby (red variety of corundum)*
- *Sapphire (blue variety of corundum)*
- *Padparadscha (orange variety of corundum)*
- *Yellow sapphire or oriental topaz (yellow variety of corundum)*
- *Eastern emerald or Green Sapphire (green variety of corundum)*
- *Eastern amethyst or violet sapphire (violet variety of corundum)*
- *Patmaraga or pink sapphire (dark pink variety of corundum)*
- *Leuco-sapphire - very rare (colorless variety of corundum*

The physical properties of corundum are:

- *Chemical composition: Al_2O_3*
- *Crystal system: trigonal*
- *Density: 3.98 to 4.10 g/cm^3*
- *Mohs hardness: 9*

The corundum is found in various fields in several parts of the world, but the corresponding artificial gemstones are now easily produced by the fusion of alumina with impurities dosed appropriately.
The poor quality of corundum, that is all that can not be used as a jewel is used in the manufacture of abrasive due to its great hardness, close to that of diamond.

Figure N°1- *Ruby*

Figure N°2- *Piece of natural corundum*

Of course also most of the corundum used for the manufacture of grinding wheels is produced synthetically, as well as for the CBN and diamond.
The progressive increase of the grinding operations urged the abrasives industry to improve more and more the production techniques, up to the setting up of a special sintering process by which crystals are obtained smaller than the micrometer suitable to form the larger grain .
This type of grain, under the effect of pressure generated during the grinding operation, is subject to micro-fractures that continuously generate new cutting edges.
Figure N°3 shows the difference between the different types of breakage of the grain stressed by grinding forces.

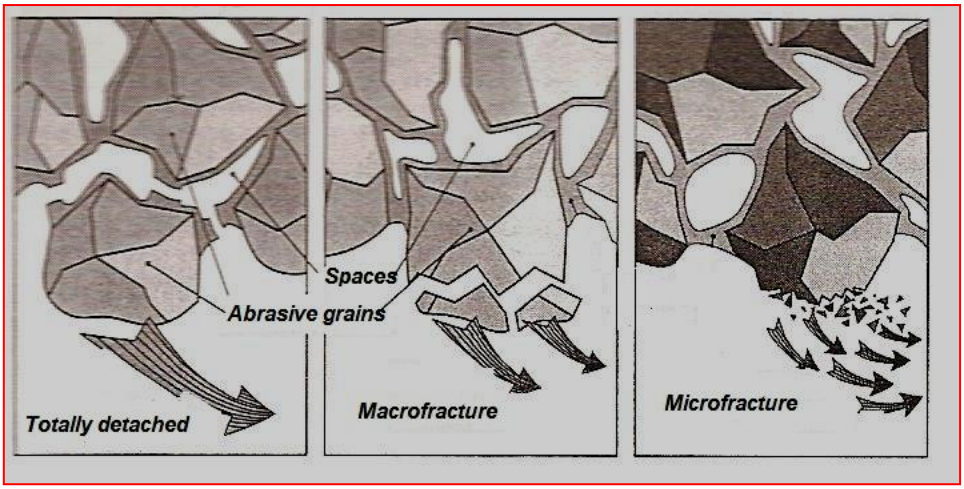

Figure N°3

The main advantages obtained are:

- *Shorter cycles because it has a higher removal capacity.*
- *Increased wheel life.*
- *At the same removal is required smaller forces (less power needed).*
- *Greater uniformity of the pieces because the wheel keeps for longer the profile.*
- *Cutting "colder" because it has a continuous regeneration of sharp edges.*
- *Lower number of dressing of the grinding wheel with a consequent saving of time and diamond tools.*

Generally you can use higher feed rates (up to 50% more), in fact, higher feeds are more cutting pressures that facilitate the crushing of the crystal of abrasive.

Figure N°4 – *Grinding wheel in pink corundum*