

## **Nanoparticles in Squigle Jr<sup>®</sup> and Tooth Builder<sup>®</sup> Toothpastes July 2020**

### **What is a nanoparticle?**

A nanoparticle is a particle having an average size of 1 to 999 nanometers. A nanometer is 10<sup>-9</sup> meter. Its abbreviation is nm.

**How large are the calcite nanoparticles in Tooth Builder<sup>®</sup> Toothpaste and Squigle<sup>®</sup> Jr Toothpaste?** Tooth Builder's and Squigle Jr's patented nanoparticles are made of calcite (calcium carbonate, CaCO<sub>3</sub>). Their average size is 70 nm. By comparison, a red blood cell is roughly the shape of a hockey puck, with a diameter of 6-8 microns (6000-8000 nm) and a thickness of 2 microns (2000 nanometers). 300,000 of Tooth Builder's and Squigle Jr's nanocalcite particles occupy the same volume as a red blood cell.

### **How do Tooth Builder's and Squigle Jr's calcite nanoparticles work?**

The majority of people with tooth sensitivity have their dentinal tubules exposed. These microscopic tubes are perpendicular to the surface of the tooth, and extend to the inner pulp chamber. They have an average inside diameter of 1 micron (1000 nm), which is more than 10 times the size of the Tooth Builder and Squigle Jr nanocalcite particles. Thus, the nanocalcite particles can easily fit into the open dentinal tubules.

When you brush your teeth, the nanoparticles spontaneously spread over every surface of the mouth, both teeth and gums. If they encounter any crevices or holes, they will migrate into them. Whenever the nanocalcite particles encounter a solid surface, they stick there by virtue of the omnipresent molecular attractive forces, such as van der Waal's forces, and electrostatic attraction.

Each time you brush, more and more nanocalcite particles migrate into your open dentinal tubules, gradually clogging them. After about a week of brushing, the tubules will be occluded, and the sensitivity will cease.

Over time, the nanocalcite particles will react with the phosphate ions in your saliva to form a mineral called hydroxyapatite, which is even more insoluble, and more acid resistant, than calcite.

If you use a fluoride toothpaste, the hydroxyapatite will eventually be converted to an even more insoluble, and more acid resistant, fluoroapatite.

### **Are Tooth Builder's and Squigle Jr's calcite nanoparticles safe?**

Tooth Builder and Squigle Jr contain nanosized particles of calcium carbonate. These particles are safe and helpful. To judge whether a nanoparticle is harmful, you must consider:

1. Is the material of which it's made toxic in bulk? In the case of calcium carbonate, the answer is NO.
2. Is the shape of the nanoparticle needlelike, such that it could puncture cells? In the case of calcium carbonate, the answer is NO. Nanosized calcium carbonate particles are irregular spherules.
3. If the nanoparticle did manage to migrate into a cell, would it interrupt or harm the cell's machinery? In the case of calcium carbonate, the answer is NO. Calcium ion and carbonate ion are naturally found in all cells and calcium carbonate is easily metabolized by all cells.

Nanosized calcium carbonate has been used worldwide for over 30 years, with no untoward incidents, in vitamin and mineral supplements, and in calcium-enriched foods, such as fruit juice.

### **Quality Assurance**

All of the ingredients and packaging for [Tooth Builder® Toothpaste](#), [Squigle JR® Toothpaste](#), and [Squigle® Enamel Saver Toothpaste](#) are made in the USA. And the toothpastes themselves are manufactured in the USA. No other Xylitol toothpaste can make that claim.