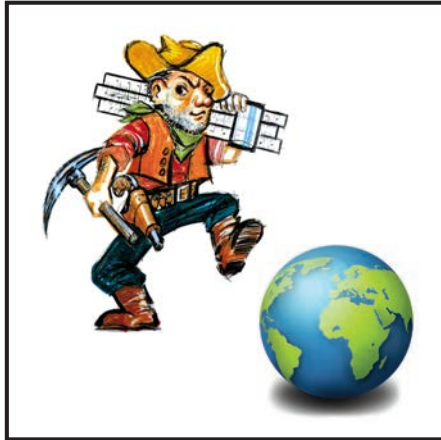
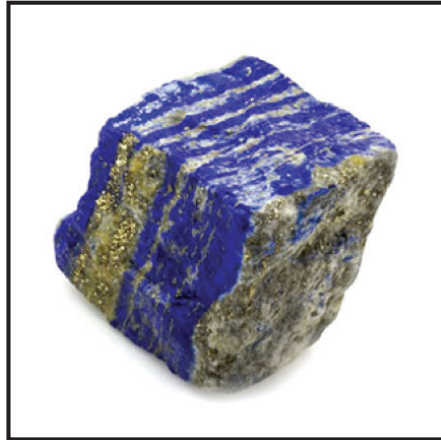


# THE DANIEL SMITH STORY

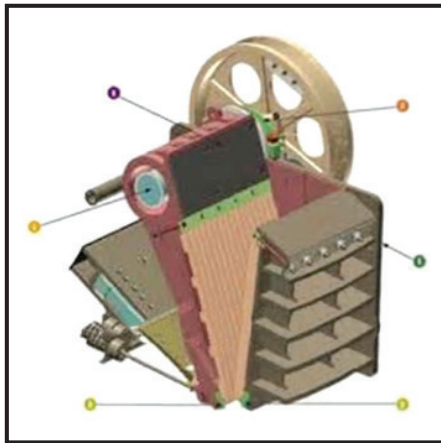
## — How We Make Paint —



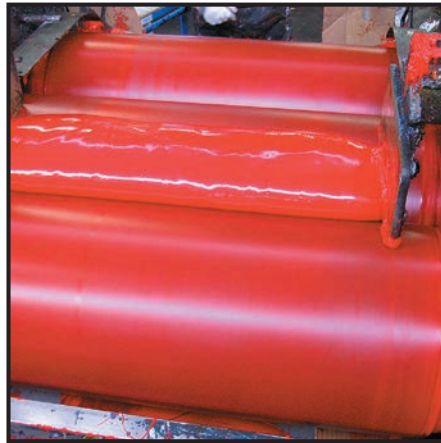
SOURCE



ACQUIRE



CLEAVING



MILL



PAINT



CREATE



**JOHN COGLEY**  
Owner of DANIEL SMITH

I started with DANIEL SMITH in 1988. Beginning in the IT department and then moving into management, becoming president in 1995 and buying the company six years ago. I have always loved and been fascinated by our Manufacturing Department. Making a product that artists use to create beauty is VERY satisfying to me.



At DANIEL SMITH, we begin with the question “How can I serve the needs of our customer”? This question holds true from sourcing the pigment through the entire manufacturing process – the end result “placing the finest made paint in the hands of the artist”.

What follows is OUR STORY.



**ANCIENT PEOPLES**  
The Need To Express Themselves

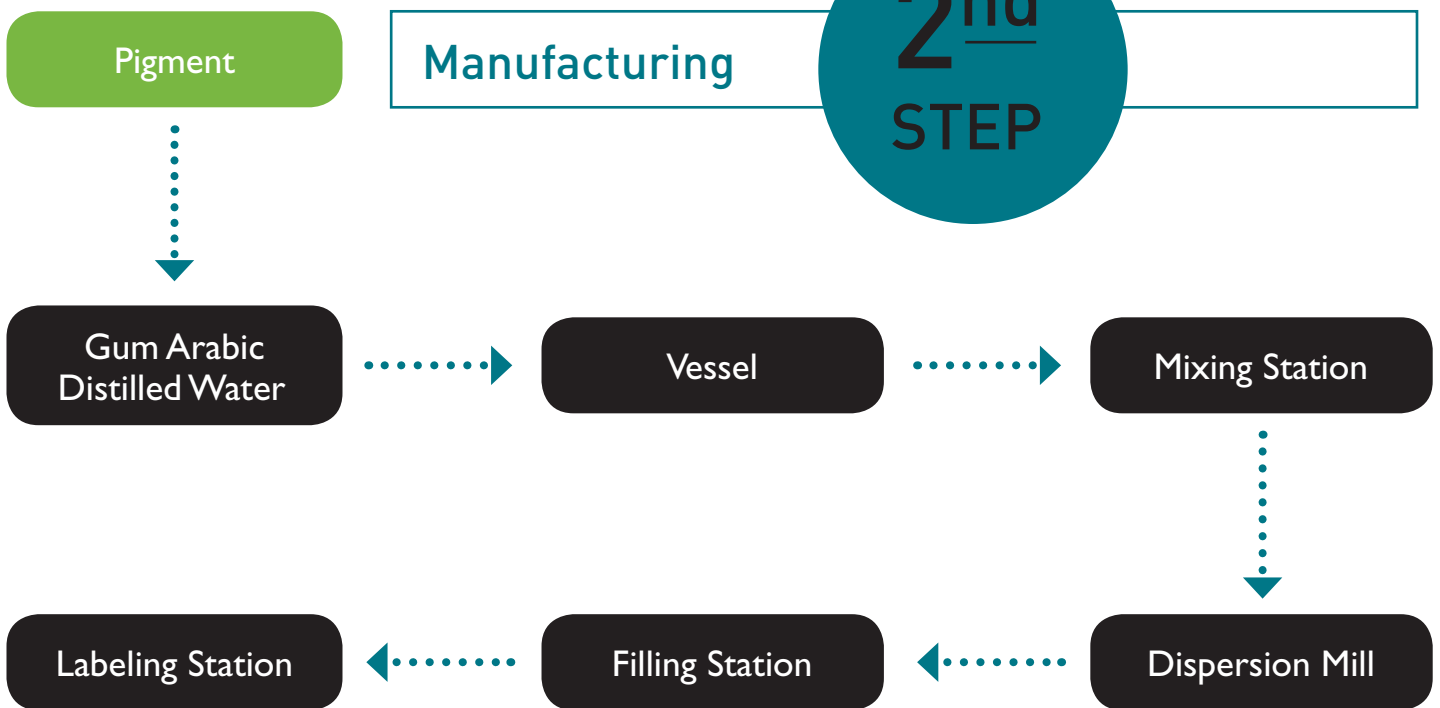
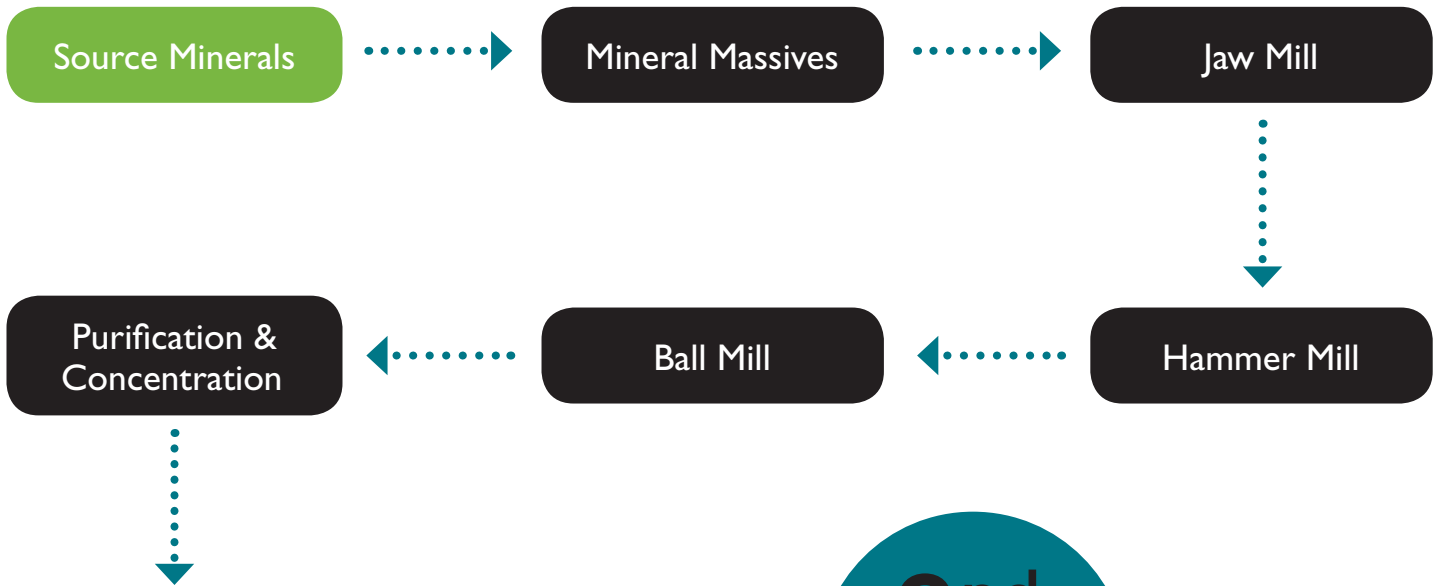
- Mayan
- Egyptian
- Incan
- Plains Indians
- Inuit Peoples
- Ancient Peoples

**THEY USED:**

- Blood
- Egg
- Crushed minerals mixed with animal fat

**1<sup>st</sup>**  
**STEP**

**PrimaTek Sourcing & Milling**



**2<sup>nd</sup>**  
**STEP**

**Manufacturing**

**Finished Watercolor Tube**



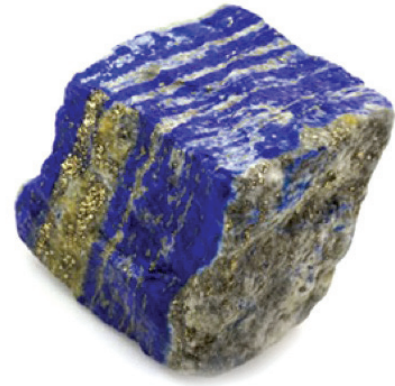




**DANIEL SMITH'S  
Own Mineralogist  
BRUCE WOOD**



**B**ruce has been a Mineralogist for 30 years. He travels the world in search of our minerals.

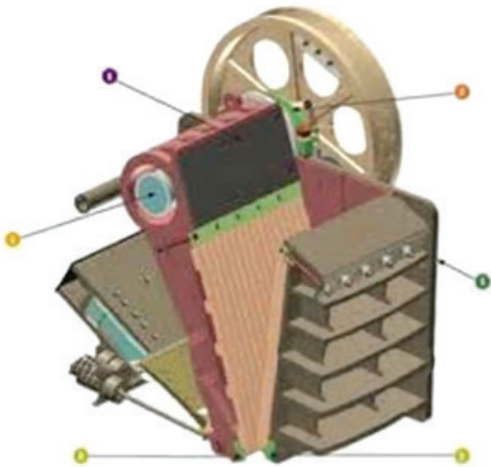


**MINERAL LAPIS**

**O**ur Lapis is sourced through both Chile and Afghanistan.

**JAWMILL PICTURE 1**

**S**ize – In the Jaw Mill the mineral goes in the size of a Basketball and comes out the size of a Softball.



**JAWMILL PICTURE 2**

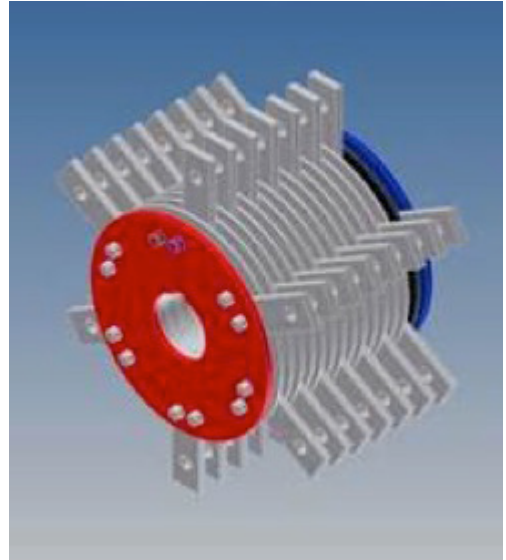


## HAMMER MILL PICTURE 1

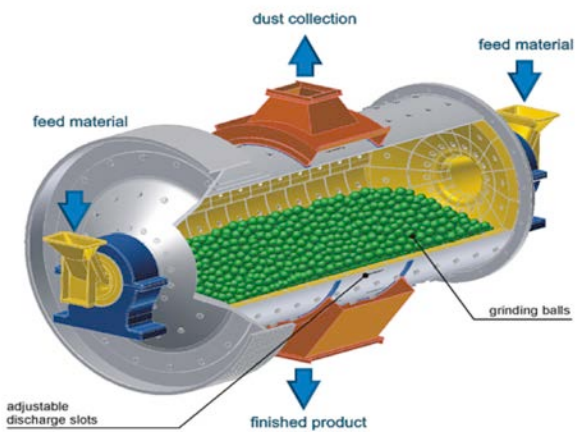


**S**ize – In the Hammer Mill the mineral goes in the size of a Softball and comes out the size of a Lima Bean.

## HAMMER MILL PICTURE 2

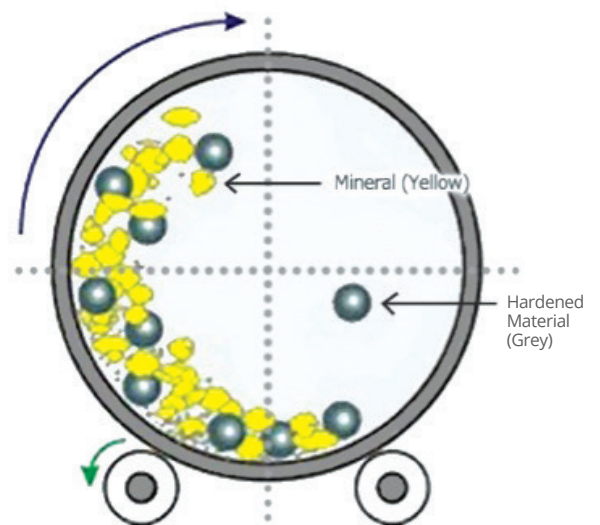


## BALL MILL PICTURE 1



**S**ize – The mineral goes in the size of a Lima Bean and comes out the size of a Human Hair.

## BALL MILL PICTURE 2



**T**he darker balls are the hardened material – silica based – at a MOHS hardness of 9+.

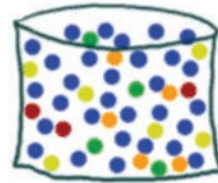
## TO A MIXING VESSEL

We Add Distilled Water, Pigment and Gum Arabic (when making watercolor)

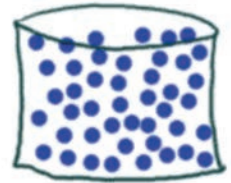


## DISTILLED WATER VS. TAP WATER

The reason it is better to use distilled water is that you get continuity of result. Every town, city etc does something different (calcium, fluoride etc) to their water supply so it adds variables to your artwork.



Tap Water



Distilled

## MIXING STATION

Just like your mixer at home these commercial mixers are used to “wet” the mixture and are the first step in the paint making process. Mixers can have a “sweep” blade (which acts like a spatula) or not. This one does not.

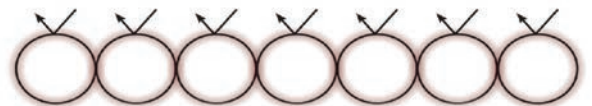


## PARTICLE AGGLOMERATE

**Pigment → Particle → Refraction → Color**  
overcoming electric static or mechanical force



Electric static or mechanical force—agglomerates or lumps will create “hot” and “cold” spots.



This structure will give maximum refraction and therefore maximum color.

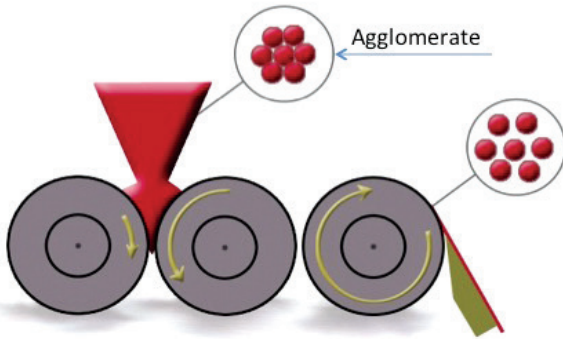


## DISPERSION MILL PICTURE 1

Here's a closer look at how a Roll Mill works:

1. The paint mixture is loaded between the feed roll and the center roll.
2. Due to the narrowing space between the rolls, most of the mixture is rejected to the feed region. The part that does make it through experiences very high shear force, dispersing the pigment particles in the Gum Arabic.
3. As it comes out the other side, the material that remains on the center roll moves through to nip between the center roll and the apron roll, experiencing even higher shear force due to the higher speeds.
4. The paint maker then scrapes the processed mixture off the apron roll with a knife and transfers it back to the apron.

This milling cycle is repeated many times until the pigment is perfectly dispersed.



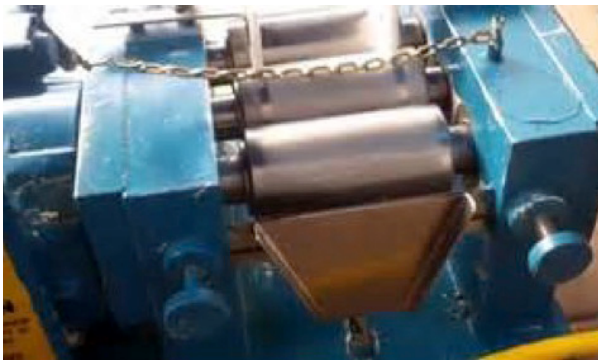
## DISPERSION MILL PICTURE 2

**D**ispersion mills perform two important functions. The first is the deaeration of product after mixing and next is removing the agglomerates caused by the particles electrostatic charges.



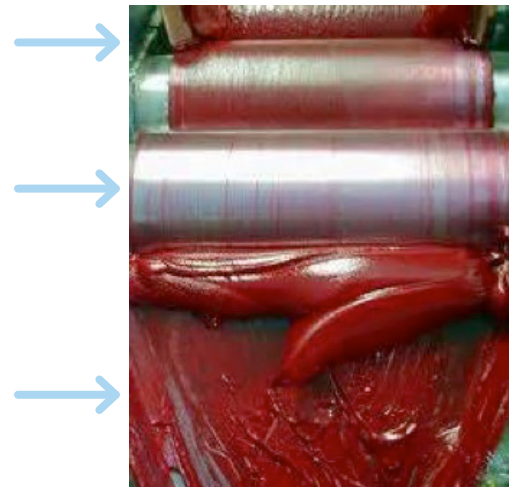
## DISPERSION MILL PICTURE 3

**T**hree Roll Mill or Dispersion Mill. The Dispersion Mill is used to assure air is not left in the paint after the mixing process and to assure that the vehicle, with watercolors Gum Arabic, completely surrounds each pigment particle. This process assures there are no agglomerates and that refraction will be consistent allowing maximum color vibrancy.



## DISPERSION MILL PICTURE 4

**T**he product is placed between the back two rolls (top arrow). These rolls move in opposition to each other causing a "tearing" effect. This is what removes the agglomerates. The third roll (middle arrow) is called the pickup roll and it transfers the paint to the front of the machine which is called the apron (bottom arrow). The process repeats (from the apron back to the tearing rolls) until the Chemists approve the final result.



## TUBE FILLING STATION



## PrimaTek PAINT



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**DANIEL SMITH: How Paint is Made**

PrimaTek Watercolors



Click Pause '||' at any point during the presentation, as needed.

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## XENON FADEOMETER

**A** Fadeometer tests for weathering and light fastness properties.



## PHOTOSPECTROMETER

**A** photospectrometer, also called a spectrophotometer, is a device that measures light intensity in different parts of the spectrum.



PrimaTek brush-outs with their corresponding minerals represented.

# Mohs Hardness Scale

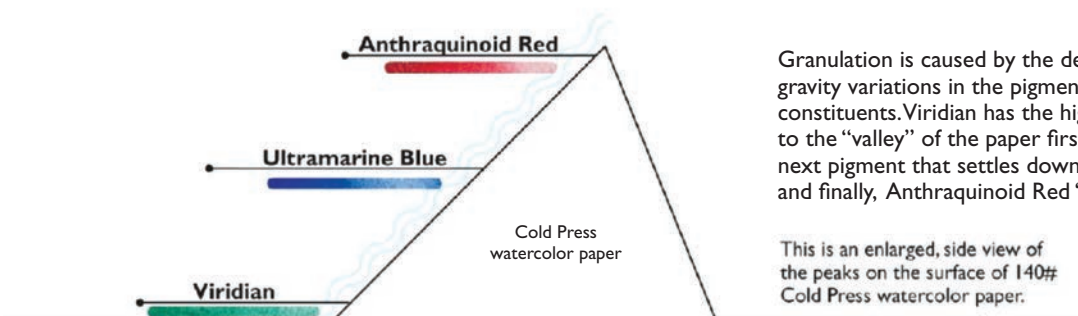
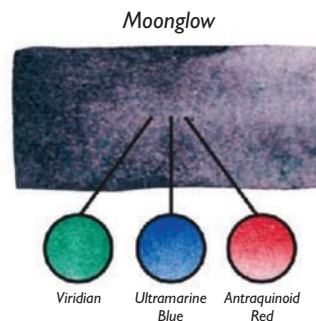
	Mineral Name	Scale Number	Common Object
↑ Increasing Hardness	Diamond	10	
	Corundum	9	Drill Bit (8.5)
	Topaz	8	
	Quartz	7	Steel Nail (6.5)
	Orthoclase	6	
	Apatite	5	Knife/Glass Plate (5.5)
	Fluorite	4	
	Calcite	3	Copper Penny (3.5)
	Gypsum	2	
	Talc	1	Fingernail (2.5)

## GRANULATION OR RETICULATION

### DANIEL SMITH Moonglow Watercolor

Moonglow, one of our most popular colors, is a great example of pigment granulation or reticulation—it contains a mixture of three pigments, each behaving quite differently:

- PG 18 (Viridian)
- PB 29 (Ultramarine Blue)
- PR 177 (Anthraquinoid Red)



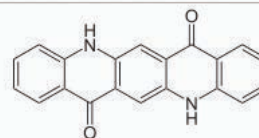
Granulation is caused by the density or specific gravity variations in the pigment or the pigments constituents. Viridian has the highest density and falls to the “valley” of the paper first (see diagram). The next pigment that settles down is Ultramarine Blue and finally, Anthraquinoid Red “floats” on the top.

This is an enlarged, side view of the peaks on the surface of 140# Cold Press watercolor paper.

## MOHS HARDNESS SCALE

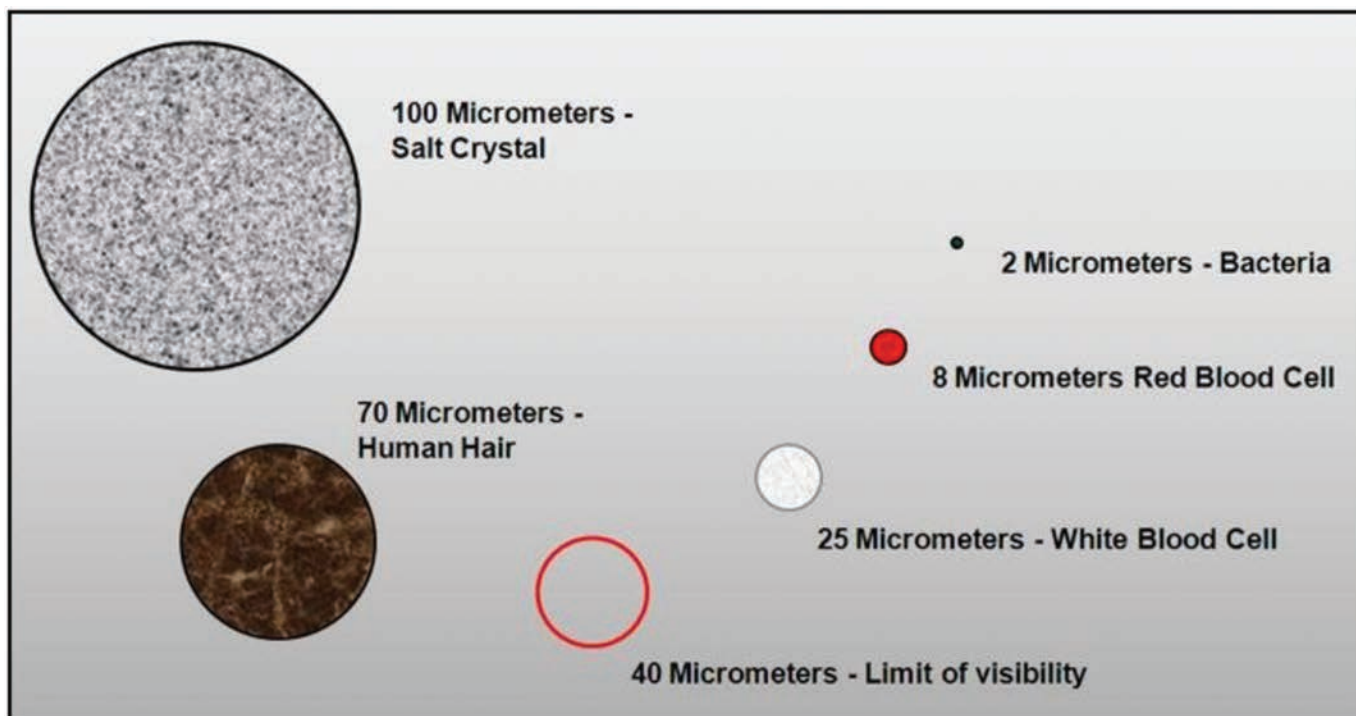
	Wax 0.2, Graphite 0.5-0.9
1 <b>TALC</b>	Soapstone 1, Tin 1.5-1.8, Alabaster 1.7
2 <b>GYPSUM</b>	Halite (Rock Salt) 2, Magnesium 2.0, Aluminum 2-2.4, Amber 2-2.5, Galena 2.5, Copper 2.5-3, Gold 2.5-3, Mica 2.8, Serpentine 2-5
3 <b>CALCITE</b>	Limestone 3, Barite 3.3, Brass 3-4, Marble 3-4, Serpentine 3-4, Dolomite 3.5-4, Azurite/Malachite 3-4
4 <b>FLUORITE</b>	Bell Metal 4, Iron 4-5, Platinum 4.3, Soda (soft) Glass 4.5, Glass 4.8-6.6, Opal 4-6
5 <b>APATITE</b>	Manganese 5.0, Steel 5-5.5, Hornblende 5.5, Stainless Steel 5.5-6.3, Lapis 5-6, Turquoise 5-6
6 <b>ORTHOCLASE</b>	Feldspar 6, Hematite 6, Magnetite 6, Pumice 6, Pyrite 6.3, Agate 6.5-7, Garnet 6.5-7.5, Hematite 6.5,
7 <b>QUARTZ</b>	Flint 7, Silicon 7.0, Tourmaline 7.3, Emery 7-9, Beryl 7.8, Tiger eye 7.0, Zoisite 6.5-7.0
8 <b>TOPAZ</b>	Case Hardened File Steel 7.8-8.5
9 <b>CORUNDUM</b>	Alundum 9+, Chromium 9.0, Carborundum 9.3, Boron 9.5
10 <b>DIAMOND</b>	

## QUINACRIDONE

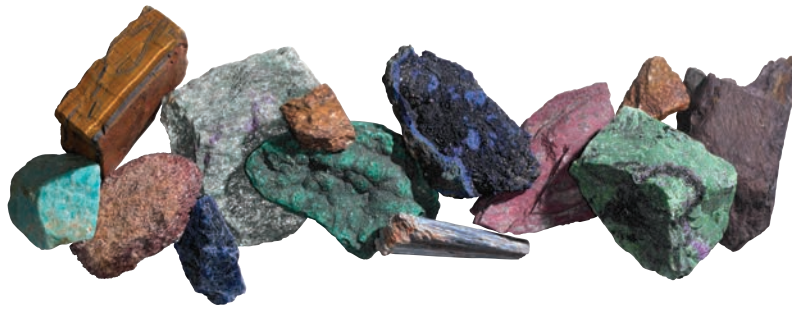


Names	
IUPAC name	5,12-Dihydro-quin[2,3-b]acridine-7,14-dione
Other names	C.I.: 73900, Pigment Violet 19
Identifiers	
CAS Number	1047-16-1 ✓
ChemSpider	13369 ✓
InChI	[show]
Jmol interactive 3D	Image <a href="#">☞</a>
PubChem	13976
SMILES	[show]
UNII	11P487375P ✓
Properties	
Chemical formula	C <sub>20</sub> H <sub>12</sub> N <sub>2</sub> O <sub>2</sub>
Molar mass	312.33 g·mol <sup>-1</sup>
Appearance	Red powder (nanoparticles)
Density	1.47 g/cm <sup>3</sup>
Solubility in water	Insoluble
Except where otherwise noted, data are given for materials in their <b>standard state</b> (at 25 °C [77 °F], 100 kPa).	
<a href="#">✓ verify (what is <span style="color:red">✗</span> ?)</a> <a href="#">Infobox references</a>	

## PARTICLE SIZE COMPARISON







**A**t DANIEL SMITH, making paints is our passion – it’s not only what we do, it is who we are!

We are always asking ourselves how we can bring the best possible product to the artist; this is the test of a paint company.

For our PrimaTek paints this means actually sourcing mineral (that we make paint from) in its “massive” state – just as it is found in nature. For our other paints, we use high performance pigment designed and used in the automobile and other industries. Both of these types of pigments have their own unique beauty and features.

Pigments from the automobile industry are nearly perfect in uniform shape, size, weight, behavior, superior lightfastness and strength. PrimaTek paints are on the other side of the spectrum, they are from the earth and are “perfect” in their “imperfection” and how their multiple elements intermingle with each other. One of the major behaviors of the PrimaTek and their “imperfection” is their beautiful

granulation – caused by the varying specific weights of constituents within the mineral pigment.

What is PrimaTek? It stands for PRIMITIVE TECHNOLOGY. Our PrimaTek paints were inspired by our true appreciation of the Native American Culture and how they used natural materials around them to make paint. Finding clays and minerals in streams and “special” locations, they would grind them up and add some type of animal fat and create paint to express themselves, most notably in ceremonial face paintings.

At DANIEL SMITH, our paint making process is very similar to what “ancient” peoples used, only with modern machinery that allows for unparalleled consistency. Thus, “Prima” – for how the “ancient” peoples created color and “Tek” for modern machine Technology.

I hope you enjoyed learning how artists have used earth pigments throughout history to express themselves and now you can too, with DANIEL SMITH PrimaTek paint.



## DANIEL SMITH WATERCOLOR CHART

**DANIEL SMITH**  
[www.danielsmith.com](http://www.danielsmith.com)