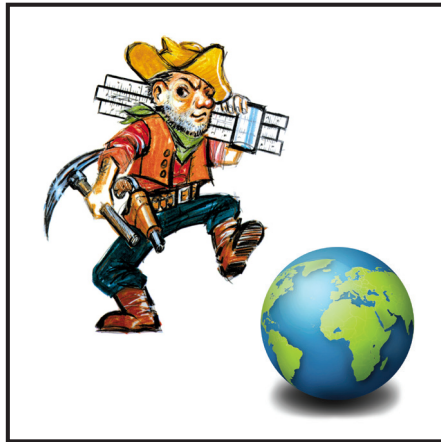
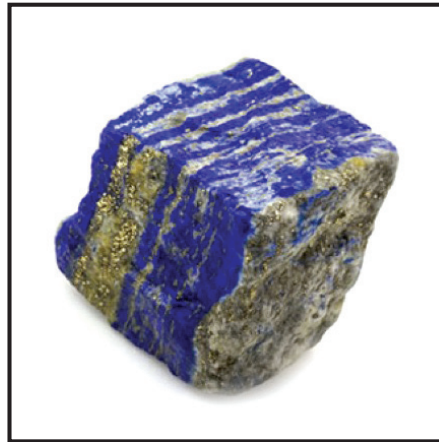


THE DANIEL SMITH STORY

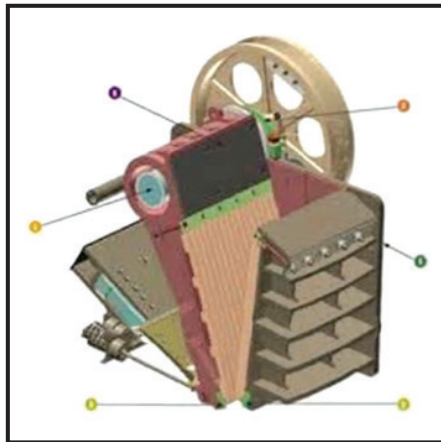
— How We Make Paint —



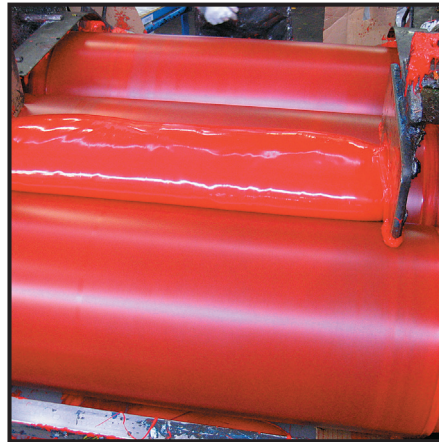
SOURCE



ACQUIRE



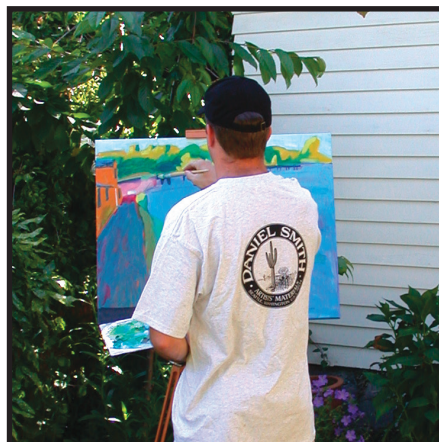
CLEAVING



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 in 2008. 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

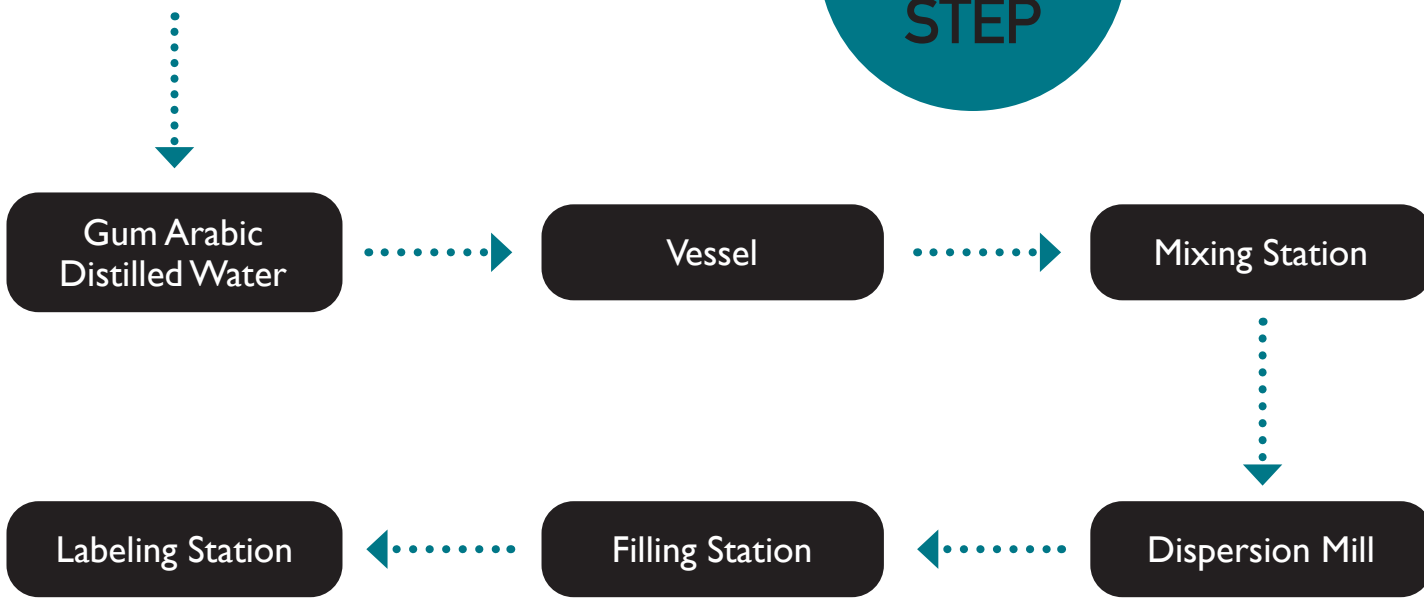
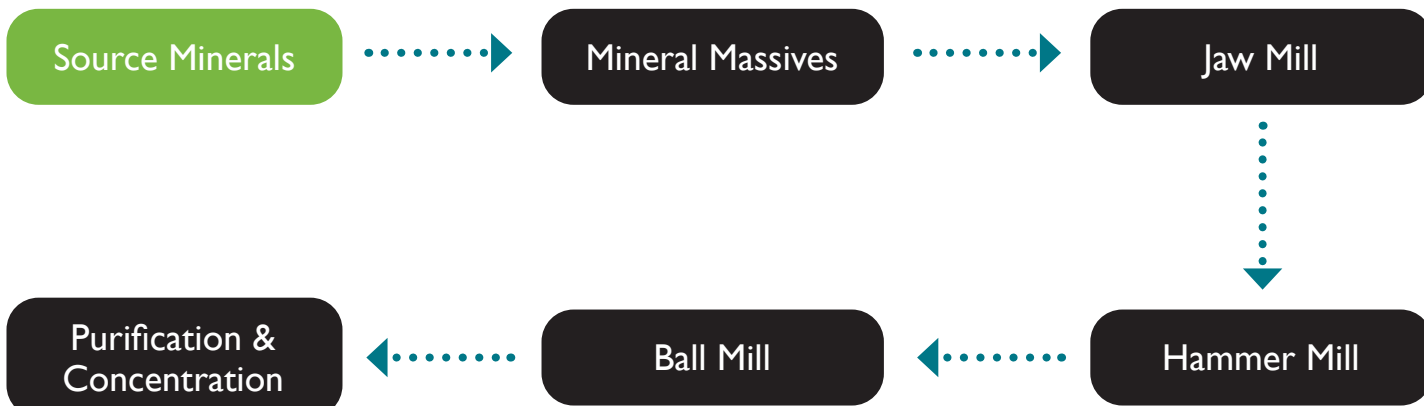
- Mayan
- Egyptian
- Incan
- Plains Indians
- Inuit Peoples
- Ancient Peoples

THEY USED:

- Blood
- Egg
- Crushed minerals mixed with animal fat

1st
STEP

PrimaTek Sourcing & Milling

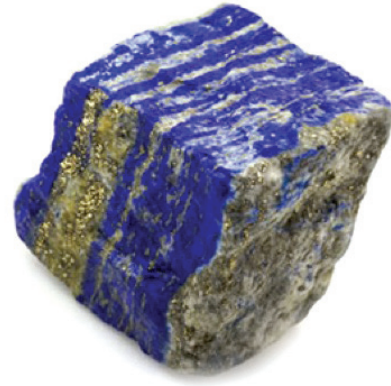




DANIEL SMITH'S
Own Mineralogist
BRUCE



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

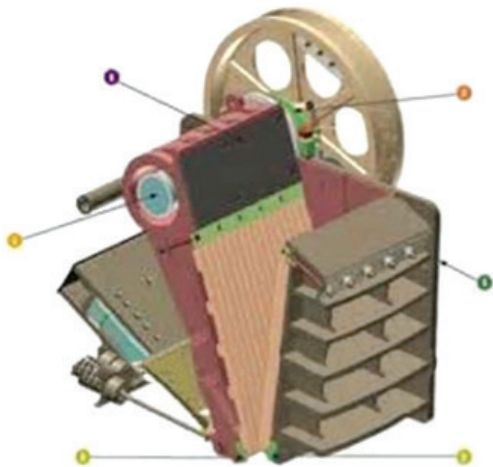


MINERAL LAPIS

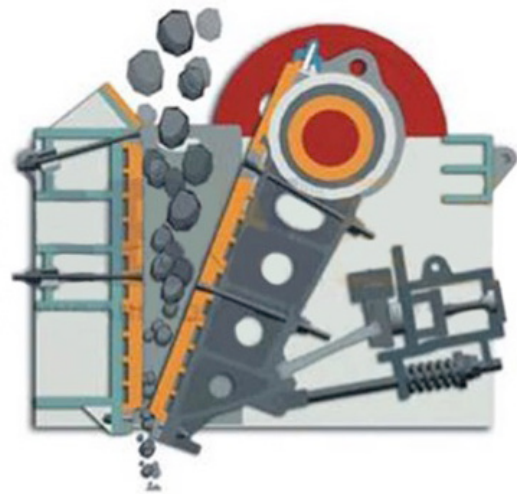
Our Lapis is sourced through both Chile and Afghanistan.

JAWMILL PICTURE 1

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



JAWMILL PICTURE 2

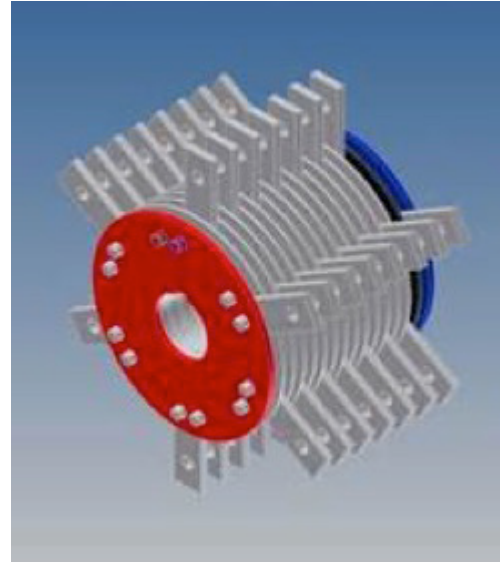


HAMMER MILL PICTURE 1

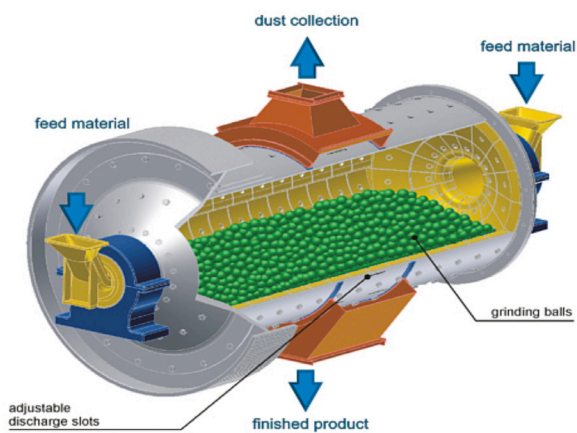


Size – In the Hammer Mill the mineral goes in the size of a Softball and comes out the size of a Lima Bean.

HAMMER MILL PICTURE 2

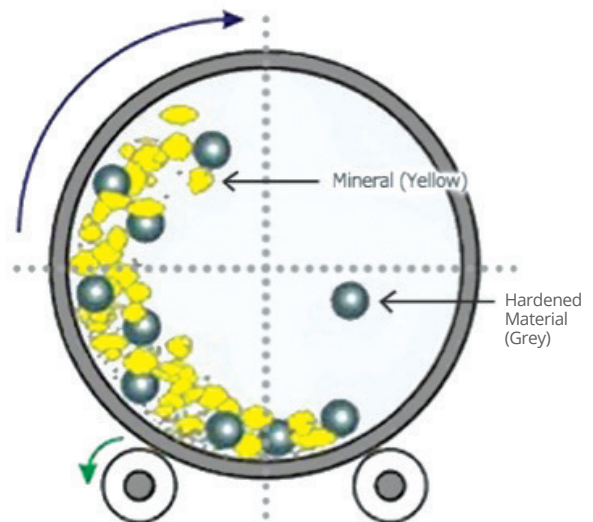


BALL MILL PICTURE 1



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

BALL MILL PICTURE 2



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

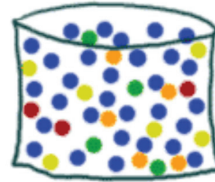
TO A MIXING VESSEL

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

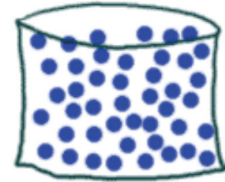


DISTILLED WATER VS. TAP WATER

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

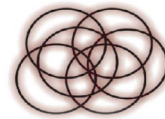
MIXING STATION

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.

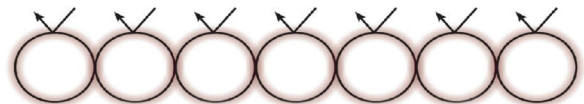


PARTICLE AGGLOMERATE

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



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



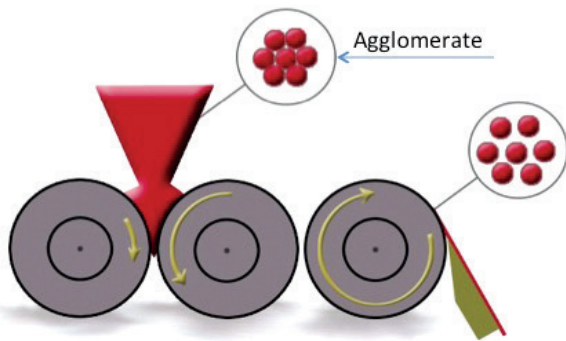
This structure will give maximum refraction and therefore maximum color.

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.

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



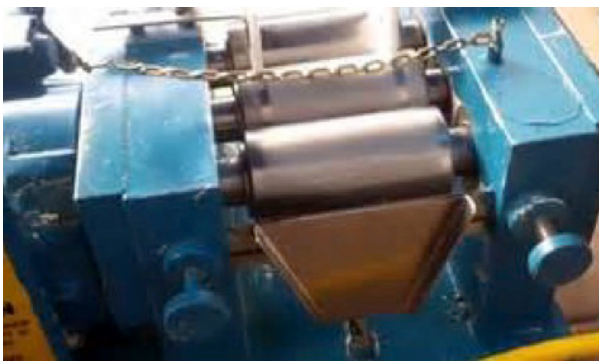
DISPERSION MILL PICTURE 2

Dispersion 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.



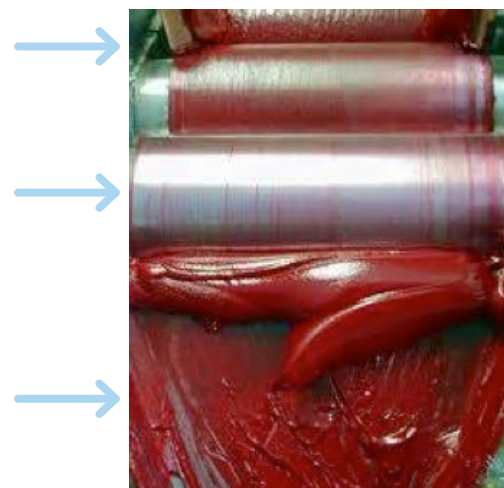
DISPERSION MILL PICTURE 3

Three 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

The 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



danielsmith.com/news/how-we-make-primatek-watercolor

A collage illustrating the production of PrimaTek Lapis Lazuli Genuine watercolor paint. On the left, a vertical strip shows the color gradient from white to deep blue. In the center is a tube of the paint. To the right are several pieces of raw lapis lazuli stones and a pile of the finely ground blue pigment powder. The Daniel Smith logo and website are in the top right corner. A QR code is located in the bottom right corner.

Watch How We Make Paint
Featuring Lapis Lazuli Genuine Watercolor

danielsmith.com

Watch the video here

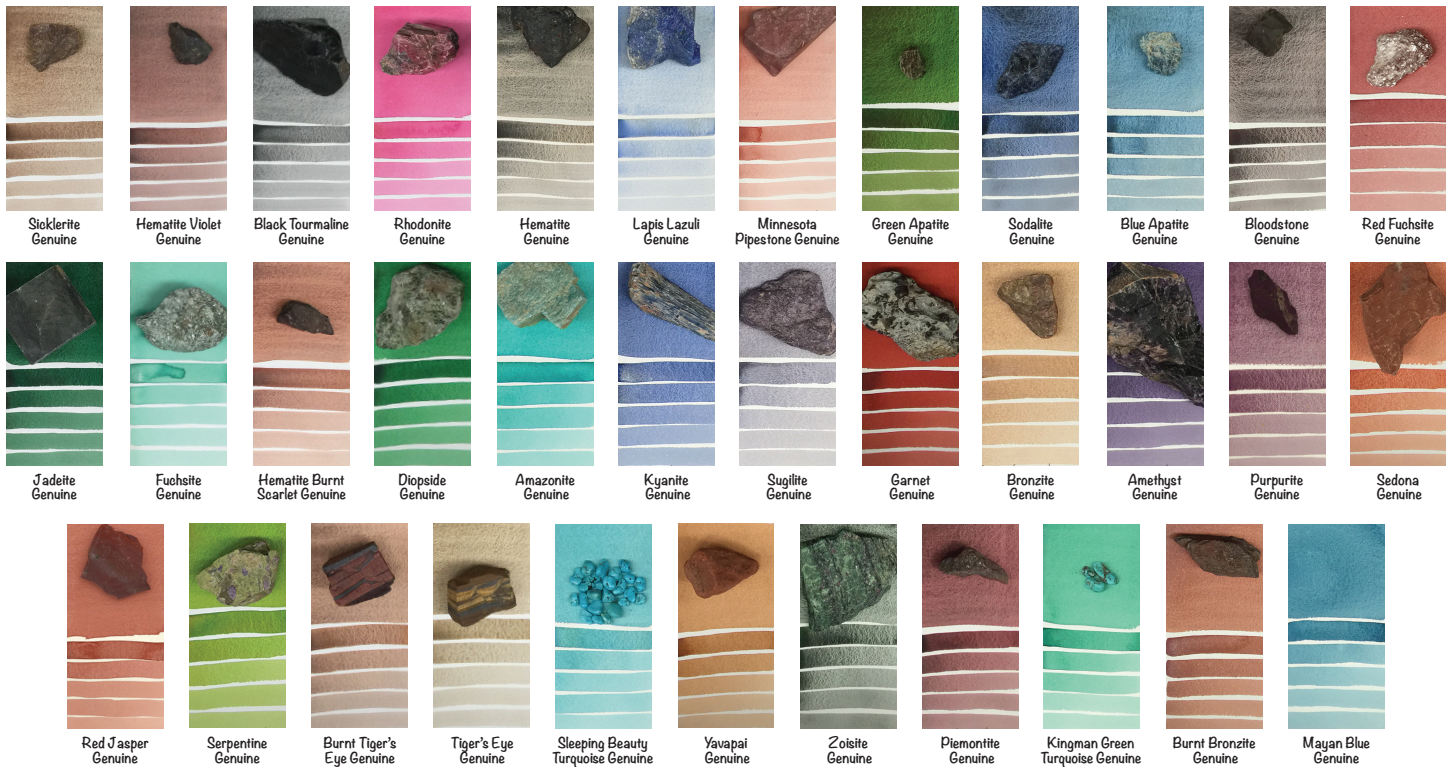
XENON FADEOMETER

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

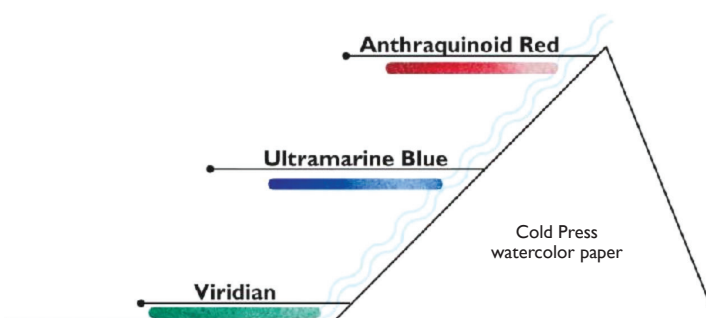
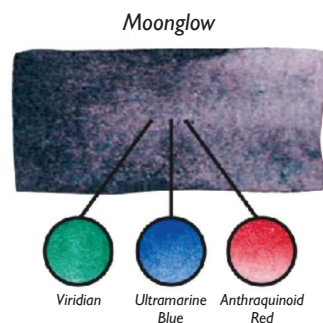
	Mineral Name	Scale Number	Common Object
↑ Increasing Hardness	Diamond	10	
	Corundum	9	Drill Bit (8.5)
	Topaz	8	
	Quartz	7	Steel Nail (6.5)
	Orthoclase	6	
	Apatite	5	Knife/Glass Plate (5.5)
	Fluorite	4	Copper Penny (3.5)
	Calcite	3	
	Gypsum	2	Fingernail (2.5)
	Talc	1	

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) and
- PR 177 (Anthraquinoid Red)



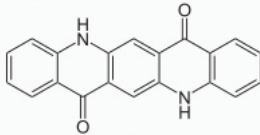
Granulation is caused by the density or specific gravity variations in the pigment or the pigments constituents. Viridian has the highest density and falls to the “valley” of the paper first (see diagram). The next pigment that settles down is Ultramarine Blue and finally, Anthraquinoid Red “floats”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

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

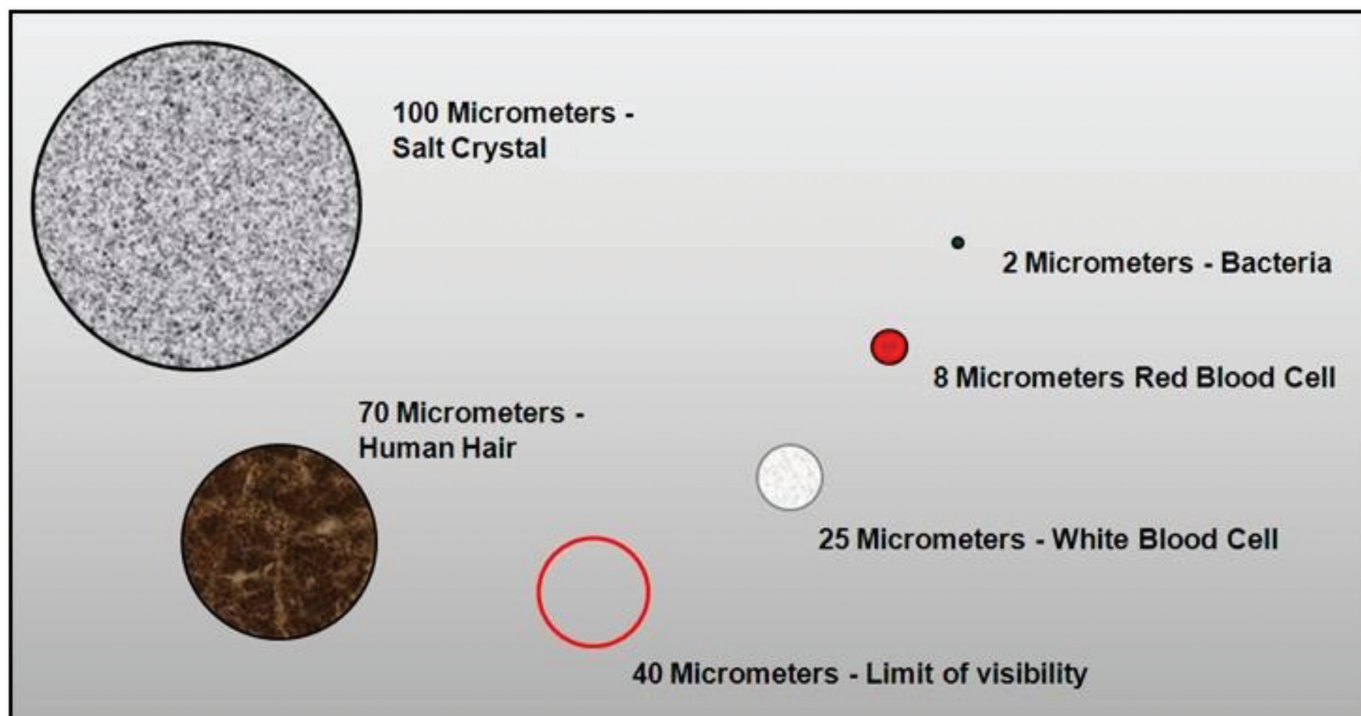
MOHS HARDNESS SCALE

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

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 Image Image
PubChem	13976
SMILES	[show]
UNII	11P487375P ✓
Properties	
Chemical formula	C ₂₀ H ₁₂ N ₂ O ₂
Molar mass	312.33 g·mol ⁻¹
Appearance	Red powder (nanoparticles)
Density	1.47 g/cm ³
Solubility in water	Insoluble
Except where otherwise noted, data are given for materials in their standard state (at 25 °C [77 °F], 100 kPa).	
✓ verify (what is ✗ ?) Infobox references	

PARTICLE SIZE COMPARISON





At 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 COLOR CHART

Buff Titanium	Nickel Titanate Yellow	Bismuth Vanadate Yellow	Hansa Yellow Light	Azo Yellow	Quinophthalone Yellow	Cadmium Yellow Light Hue	Cadmium Yellow Medium Hue	Aurolin (Cobalt Yellow)	Cadmium Yellow Deep Hue	Hansa Yellow Medium	Mayan Yellow	Lemon Yellow	Indian Yellow	Naples Yellow	Hansa Yellow Deep	New Gamboge	Isolindine Yellow	Permanent Yellow Deep	Azine Red Gold	Pyrol Orange	Permanent Orange
Cadmium Orange Blue	Perinone Orange	Cadmium Red Scarlet Hue	Transparent Pyrol Orange	Organic Vermilion	Mayan Orange	Quinacridone Coral	Pyrol Scarlet	Perylene Scarlet	Anthraquinoid Scarlet	Cadmium Red Medium Hue	Pyrol Red	Perylene Red	Permanent Red	Permanent Red Deep	Quinacridone Red	Anthraquinoid Red	Mayan Red	Alizarin Crimson	Pers. Alizarin Crimson	Rhodazin Genuine	Gamme
Rose Madder Permanent	Opera Pink	Pulfers Pink	Quinacridone Pink	Quinacridone Rose	Quinacridone Lac	Quinacridone Magenta	Pyrol Crimson	Quinacridone Fuchsia	Mayan Violet	Bordeaux	Permanent Violet	Quinacridone Violet	Perylene Violet	Cobalt Violet	Cobalt Violet Deep	Wisteria	Ultramarine Red	Rose of Ultramarine	Quinacridone Purple	Imperial Purple	Parasite Genuine
Ultramarine Violet	Ancrydyl Genuine	Carbazole Violet	Cobalt Blue Violet	Mongrel	Shadow Violet	Saphire Genuine	Nyanta Genuine	Indigo	Mayan Dark Blue	Indanthrone Blue	Soliste Blue	Lapis Lazuli Genuine	French Ultramarine	Ultramarine Blue	Cobalt Blue	Phthal Blue (Green Shade)	Lavender	King's Royal Blue	Hendler Blue	Phthal Blue (Blue Shade)	Fusion Blue
Mayan Blue Genuine	Cerulean Blue	Cerulean Blue Chromium	Manganese Blue Hue	Phthal Blue Turquoise	Cobalt Teal Blue	Phthal Turquoise	Kingman Green Turq. Gen.	Ultramarine Turquoise	Shocking Beauty Turq. Gen.	Cobalt Turquoise	Amazoite Genuine	Blue Aquilla Genuine	Lunar Blue	Cobalt Green Pale	Fuchsine Genuine	Widman	Dispersed Genuine	Phthal Green (Blue Shade)	Cerulean Green	Jadeite Genuine	Cobalt Green
Spring Green	Permanent Green Light	Phthal Yellow Green	Permanent Green	Phthal Green (Yellow Shade)	Hooker's Green	Sap Green	Serpentine Genuine	Chromium Green Oxide	Green Aquilla Genuine	Terra Verde	Deep Sap Green	Perylene Green	Prussian Green	Rare Green Earth	Uderson Green	Zoisite Genuine	Olive Green	Green Gold	Rich Green Gold	Nickel Azo Yellow	Bronze Genuine
Vermilion Ochre	Burnt Brimstone Genuine	French Ochre	Raw Sienna Light	Burgundy Yellow Ochre	Chrome Titanium Yellow	Yellow Ochre	Mars Yellow	Yapgal Genuine	Raw Sienna	Transparent Yellow Oxide	Monte Anzani Natural Sienna	Brown-Find Red Iron Oxide	Quinacridone Deep Gold	Italian Deep Ochre	Lunar Earth	Burnt Yellow Ochre	Garnet Genuine	Reaumur French Ochre	Burgundy Red Oxide	Indian Red	
Vandyke Brown	Italian Burnt Sienna	Quinacridone Burnt Orange	Quinacridone Sienna	Pompadour	Red Fuchsine Genuine	Terra Ercoloro	Minerale Perspice Gen.	Italian Venetian Red	English Red Earth	Red Luster Genuine	Hematite Burnt Scarlet Gen.	Quinacridone Burnt Scarlet	Perylene Maroon	Sedona Genuine	Deep Scarlet	Naphthamide Maroon	Lunar Red Rock	Pemphig Genuine	Tiger's Eye Genuine	Burnt Tiger's Eye Genuine	Hematite Genuine
Cerise Green Raw Umber	Hematite Violet Genuine	Mummy Sienna	Permanent Brown	Quinacridone Gold	Raw Umber Violet	Transparent Brown Oxide	Transparent Red Oxide	Fire Gold Ochre	Burnt Sienna Light	Green-Find Brown Iron Oxide	Burnt Sienna	English Red Ochre	Burnt Umber	Quinacridone Yellow Iron Oxide	Raw Umber	Sipia	Sickert's Genuine	Van Dyck Brown	Bloodstone Genuine	Lunar Violet	Neutral Tint
Graphite Grey	Jain's Grey	Payson's Blue Grey	Payson's Grey	Alvera's Caliente Grey	Alvera's Fresco Grey	Joseph 2's Warm Grey	Joseph 2's Neutral Grey	Joseph 2's Cool Grey	McDucken Black	Jain's Black (Red/Green)	Jain's Black (Blue/Orange)	Ivory Black	Lamp Black	Lunar Black	Black Turmaline Genuine	Grey Titanium	Chinese White	Titanium White	Duochrome Green Pearl	Duochrome Blue Pearl	Duochrome Oceanic
Duochrome Turquoise	Duochrome Cabot Blue	Duochrome Aquamarine	Duochrome Emerald	Duochrome Desert Bronze	Duochrome Saguaro Green	Duochrome Adobe	Duochrome Autumn Mystery	Duochrome Cactus Flower	Duochrome Hibiscus	Duochrome Violet Pearl	Duochrome Mauve	Duochrome Tropic Sunrise	Duochrome Lapis Sunlight	Duochrome Violet Fantasy	Duochrome Arctic Fire	Interference Blue	Interference Copper	Interference Gold	Interference Green	Interference Lac	Interference Red
Interference Silver	Interference Shimmer	Interference White	Interference Moonstone	Interference Blue-Silver	Interference Sunstone	Interference Aztec Gold	Interference Bronze	Interference Goldstone	Interference Copper	Interference Gold	Interference Topaz	Interference Jade	Interference Garnet	Interference Hermit Raspberry	Interference Roset	Interference Ruby	Interference Scotch Red	Interference Electric Blue	Interference Sapphire	Interference Antique Bronze	Interference Antique Copper

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