



# THE MINERALOGY OF STAR TREK: NOTITIAE NOVUM

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*“Native sulphur, diamonds. This place is a mineralogist’s dream. Yet there is something about sulphur. Something very old. Something? If only I could remember.”*  
(Captain James T. Kirk, 2267)

*“Asteroid mining. To think anyone would be foolish enough to be taken in by that old trick...”*  
(Quark, 24th century).

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## INTRODUCTION

*Notitiae novum* refers to “a new awareness” of recently discovered information with respect to minerals in the Star Trek universe — as in *Star Trek: The Next Generation*, where the *USS Enterprise* is on a “continuing mission,” and in the most recent series, *Star Trek: Discovery* and *Star Trek: Picard*. Added to that, continual reviewing has, as before, uncovered further additions and corrections to the previously described canon of minerals and substances with mineral-like names. Some references to these substances are from fleeting mentions, easily missed. However, most importantly, almost all scripts for most of the series are now available. The purpose of this article is to contribute further new additions, new updates and corrections to the previous two articles about the minerals and mineralogy as they exist in the Star Trek universe (de Fourestier, 2005; de Fourestier, 2016).

Geology has often been central to Star Trek plot lines. In fact, over 100 episodes and films make reference to mineral deposits, mining or geology in some manner. Sometimes what is being mined is not mentioned but the act of mining forms the backdrop to the story. An example of this is the new “particle fountain” technology designed to mine a planet’s resources from space, wherefrom the ore could more easily be shipped, as in the case of the moon Tyrus VIIa.<sup>1</sup>

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<sup>1</sup> Once proven, it was hoped that the technology could be used for mining on other planets including Carema III. Episode: *The Quality of Life* (TNG), 1992.

Even when not named, minerals are visible in many episodes. Aside from the mineral specimens and a Moroccan Ammonite fossil on display in Captain Picard's ready room, the Mineralogy Lab on board the *USS Enterprise* showed samples of agate being analysed and amethyst slabs on a counter. There is a Starfleet mineralogy database as well. The staff mineralogist and geologists were to complete a mineral survey of a series of planets<sup>2</sup>. In another episode, Lieutenant Commander Data, in the role of a geological engineer, had apparently visited a "little-known" mineral shop in Chinatown in 19th century San Francisco<sup>3</sup>. In Lieutenant Commander Geordi La Forge's room onboard the *USS Enterprise* a Brazilian amethyst geode is seen. The same geode is seen with many other minerals in the office of Yanas Tigan, the owner of a large Pergium mine on Sapporo VII.<sup>4</sup> While in a shop on Deep Space 9, a smoky quartz crystal is picked up by the El-Aurian Martus Mazur<sup>5</sup>. A large geode is also seen on a shelf in Commander Shran's ready room on board the Andorian ship *Kumari*<sup>6</sup> and was likely destroyed when the *Kumari* was destroyed. When stranded on the planet Galorndon Core in the Neutral Zone, Lieutenant La Forge finds what seem to be small pebbles of a metallic mineral, which he melts into hard gray metal spikes and then uses these to climb out of a hole<sup>7</sup>.

Perhaps the most unusual reference to the role mineralogy plays in the series is the musical piece entitled "A Lesson in Vulcan Mineralogy." The rather delicate piece was written for the motion picture *Star Trek: Beyond* (2016) by the renowned composer and Academy Award winner Michael Giacchino.



**Figure 1. Image of a dilithium crystal cluster in a Starfleet mineralogical database on board the *USS Enterprise*. Photo copyright 1992 by Paramount Pictures, all rights reserved.**

Other minerals are not named but are implied. For example, reference is made to magnetic deposits below a desert basin on the M-class (Minshara-class) Torothan home world in the Alpha quadrant<sup>8</sup>. The most likely mineral would be magnetite. During the flight of the transwarp shuttlecraft *Cochrane*, it is stated that the ability to achieve greater speed was made possible by the discovery of a new form of dilithium, which could remain stable at high frequencies, from an asteroid field in the Delta quadrant, by the crew of the *USS Voyager*<sup>9</sup>. Whether this means it is a variety or a polymorph is not clear but it does align with real mineralogy where varietal or polymorphic variance can mean different properties.

In 2017 the next incarnation of the series, *Star Trek: Discovery*, appeared on cable TV via CBS All Access. This series is considered a somewhat dark departure from the others and also makes fewer

<sup>2</sup> *Pen Pals* (TNG), 1989

<sup>3</sup> Episode: *Time's Arrow: Part II* (TNG), 1992

<sup>4</sup> Episodes: *Aquiél* (TNG), 1992, *Force of Nature* (TNG), 1993. *Prodigal Daughter* (DS9), 1999

<sup>5</sup> Episode: *Rivals* (DS9), 1993

<sup>6</sup> It is a "thunderegg" from the western United States. Apparently it was sold to a private collector on [Ebay](#) in 2007.

Episode: *Proving Ground* (ENT), 2004

<sup>7</sup> Episode: *The Enemy* (TNG), 1989

<sup>8</sup> Episode: *Desert Crossing* (ENT), 2002

<sup>9</sup> Episode: *Threshold* (VOY), 1996

references to minerals or geology than the others. That said, the few references that do appear demonstrate once again that the writers have no clue about the nomenclature of minerals and rocks or how such names are given.

Since DIS, another series, called *Star Trek: Picard*, have been aired in 2019 along with a series of mini-episodes under the name *Star Trek: Short Treks*. Like *Discovery*, these newer incarnations have molded themselves to on-line “binge” viewers and follow a season-long story arc instead of having a new independent story each week, as in the days of over-the-air television. Consequently, the format involving a new mission each time, which lent itself to some geological expedition or happenstance find on some new planet in a new situation, was no longer adhered to. The result is far fewer references to the natural history of a given world or asteroid field. Furthermore, these new programs tend to focus more on the dramatic rather than the scientific aspects of the storylines. As a result they seem to have drifted away from the “science” part of the science-fiction genre we came to know in the original *Star Trek* series. There seems to be less interest now in depicting new discoveries that could conceivably exist within the realm of reality (“hard” science fiction) than to invent fantasy concepts for their pure entertainment value. If this trend persists, mineral and mineral-like names are likely to decline in use, and if new ones are introduced they will probably not involve materials that have any chance of being found in nature.

**Table 1. Names of series and the number of different minerals and mineral-like names used in each.**

ABBRE- VIATIONS	NAME OF SERIES	IN PRODUCTION	NUMBER OF NAMES	NUMBER OF EPISODES	RATIO
DIS	Discovery	2017-present	15	29	0.52
DS9	Deep Space 9	1993-1999	61	176	0.35
ENT	Enterprise	2001-2005	35	99	0.36
MPF	<i>Motion pictures</i>	1979-2016	9	13	0.69
PIC	Picard	2020-present	3	10	0.30
STS	Short Treks	2018-present	2	10	0.20
TAS	Animated series	1973-1974	7	22	0.32
TNG	Next Generation	1987-1994	74	178	0.42
TOS	Original series	1966-1969	50	79	0.63
VOY	Voyager	1995-2001	65	172	0.38

Table 1 summarizes the total number of different mineral and mineral-like names mentioned in each series in the *Star Trek* universe, the number of episodes in each series, and the ratio of names to episodes in each series. Only 12 names are attributable to the three most recent series. Not indicated in Table 1 is how *often* each name is mentioned in that series, although new locations or situations where such material is mentioned have been added to the compilation in the course of the present study. This includes a few corrections to previous entries.

If one compares the ratios of the number of names to the number of episodes, most range between 0.3 and 0.4. The lowest ratio is for the STS series with 0.2 and the highest 0.63 by TOS (note: the MPF relate to various series or are unrelated to the traditional *Star Trek* canon).

## LATINUM

While latinum, a liquid metal, was never mentioned in TOS it has been found that, after dilithium, latinum is by far the most mentioned substance in the *Star Trek* universe. This does not even include what is referred to as “gold-pressed” latinum, although it is clear that latinum is often used as a synonym for gold-pressed latinum and is not a separate substance. The entries for latinum in the previous articles are for latinum as a single substance distinct from latinum amalgamated with gold to solidify it.

Currency of any kind is rarely mentioned in the Star Trek universe, but latinum is the currency used by the Ferengi. Consequently, virtually all references to it are in the context of the Ferengi culture. As latinum is so highly prized by this single species, one might assume that it was first found on the M-class planet Ferenginar in the Alpha quadrant, or at least somewhere in Ferengian space. However, although no Ferengi ever appeared in TOS, they do appear in *Star Trek Enterprise* (ENT). This represents a small disconnect in the continuum, as the Ferengi and latinum are unknown in the period of TOS, which postdates ENT. For the Ferengi, gold was as valuable as latinum, although gold loses its value later in the Star Trek timeline. Since most of the episodes where Ferengi appear are in the DS9 Series, the greatest number of references is also in that series. In all, it is mentioned 56 times. When adding the references with gold-pressed latinum, the total is 66.



**Figure 2. Latinum and gold-pressed latinum. Photo copyright 2007 by Paramount Pictures, all rights reserved.**

#### UPDATES TO PREVIOUSLY LISTED NAMES

Continued scrutiny of the episodes has yielded additional information on the materials mentioned in the previous articles, as detailed below:

#### *Fictitious Minerals*

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##### **Astatine**

Astatine—an unfortunate choice of name by the scriptwriter, since astatine is already the name of an element—is an unrelated substance found in deposits in the marshes and in the riverbeds on an unnamed M-class planet in the Orellius system, about 160 million kilometers from Orellius Minor in Sector 401 in the Alpha quadrant. Episode: *Paradise* (DS9), 1994

##### **Bilithrium**

Commander Riker mentions bilithrium in a discussion, stating that the Klingon Duras sisters tried to sell explosives made from bilithrium on Deep Space 9. Episode: *First Born* (TNG), 1994

##### **Dilithium, Dilithium Ore**

On Tellun in the Alpha quadrant, dilithium crystals in a pocket caused an explosion in the mine. From this reference one learns that dilithium possesses piezoelectric properties. The M-class planet Xahea (galactic coordinates: 003-1040808.1230 003-111309.3) is known for its caves, with important natural dilithium reserves. Although dilithium has been depicted as milky white (sometimes actual quartz crystals have been used as props), the sample of dilithium from Xahea presented by its queen is a lustrous, transparent, fluorescent blue. Dilithium crystals were also given by the Ankari to the *USS Equinox* in the Delta quadrant. A passing mention is made on board the *USS Raven* that dilithium occurs in an unnamed asteroid field on the edge of Borg space in the Alpha quadrant. Lieutenant Paris mentions that he was

returning with a full load of dilithium ore in the Delta flyer after surveying 15 planets, asteroid fields and nebulae in the Delta quadrant. Ensign Ballard mentions his unsuccessful search for dilithium ore on a M-class planet in the Vyntadi Expanse. Reference to a dispute involving dilithium mining rights on a planetoid in Nausicaan space is used in a holodeck simulation exercise in board *USS Voyager*. The dilithium mines on the M-class planetoid Corvan II in the Beta quadrant, source of 40% of the Federation's dilithium crystals, were protected from destruction by the *USS Discovery* in 2256. Dilithium deposits caused the disintegration of Drema V. The largest dilithium deposit ever found was on the M-class planet Drema IV (also Benev Selec) in the Selcundi Drema system in the Alpha sector by the *USS Enterprise* in 2365. The deposit was so large that it focused and augmented the planet's naturally occurring heat and through its crystal structure, resulting in increasing seismic and volcanic activity that endangered the planet. Episodes: *Skin of Evil* (TNG), 1988, *Pen Pals* (TNG), 1989, *Little Green Men* (DS9), 1995, *Return to Grace* (DS9), 1996, *Equinox: Part I* (VOY), 1999, *Dark Frontier: Part I* (VOY), 1999, *Memorial* (VOY), 2000, *Ashes to Ashes* (VOY), 2000, *Nightingale* (VOY), 2000, *Q2* (VOY), 2001, *Context is for Kings* (DIS), 2017, *The Butcher's Knife Cares Not for the Lamb's Cry* (DIS), 2017, *Choose Your Pain* (DIS), 2017, *Runaway* (STS), 2018, *An Obol for Charon* (DIS), 2019, *Such Sweet Sorrow: Part I* (DIS), 2019

### **Dilithium Hydroxyl**

Dilithium hydroxyl also occurs along with magnesium and chromium in the Paulson Nebula between Zeta Alpha II and Sentinel Minor IV in the Alpha quadrant. It was also ejected by an alien space craft being pursued by the *Enterprise (NX-01)*. Episodes: *The Best of Both Worlds: Part I* (TNG), 1990, *Precious Cargo* (ENT), 2002

### **Gallicite**

The Gallicite discovered on the fourth planet in the system occupied by the Sakari actually occurred in veins found in an extensive underground mine. It is also mined in the central desert on the Nezu home world in the Delta quadrant. Episodes: *Blood Fever* (VOY), 1997, *Rise* (VOY), 1997)

### **Gold-pressed Latinum**

Gold-pressed latinum is offered by the Ferengi in payment for items from the Alpha quadrant and in the Gamma quadrant. This mercury-like liquid metal is converted to solid form (bars) by amalgamation with gold, and is mentioned by Ferengi in various discussions. It is unknown in the alternate "Terran" universe. Episodes: *Q-Less* (DS9), 1993, *Progress* (DS9), 1993, *Vortex* (DS9), 1993, *The Homecoming* (DS9), 1993, *The Siege* (DS9), 1993, *Invasive Procedures* (DS9), 1993, *Melora* (DS9), 1993, *Necessary Evil* (DS9), 1993, *Gambit: Part I* (TNG), 1993, *Crossover* (DS9), 1994, *Prophet Motive* (DS9), 1995, *The Price* (TNG), 1995, *Family Business* (DS9), 1995, *Business as Usual* (DS9), 1997, *In the Cards* (DS9), 1997, *The Magnificent Ferengi* (DS9), 1997, *Who Mourns for Morn?* (DS9), 1998, *Change of Heart* (DS9), 1998, *In the Pale Moonlight* (DS9), 1998, *The Dogs of War* (DS9), 1999, *Inside Man* (VOY), 2000, *Acquisition* (ENT), 2002

### **Jevonite**

The Ferengi Grand Nagus mentions purchasing jevonite in a conversation reinforcing the fact that it is a valuable mineral. Episode: *Ferengi Love Songs* (DS9), 1997

### **Kemocite**

Kemocite is mentioned in a discussion. It is described as being radiolytic, meaning that it can cause molecular decomposition of another substance as a result of radiation. Episode: *Stratagem* (ENT), 2004

### **Ladarium**

Ladarium ore is mined using a sluice, indicating that it has a relatively high specific gravity (density). A source of ladarium is on Volon III in the Cardassian part of the demilitarized zone in the Alpha quadrant. Episode: *Tribunal* (DS9), 1994

### **Latinum**

This gray, mercury-like liquid metal can be stabilized in solid form by amalgamation with gold. Lieutenant Paris mentions it in passing while in the Delta quadrant. One Ferengi book states that latinum can tarnish, which means it can absorb another element from the air. It is also mentioned in many conversations by Ferengi. A reference for payment of a bounty on Harry Mudd is also given in Latinum. Episodes: *Progress* (DS9), *Gambit: Part I* (TNG), 1993, *Vortex* (DS9), 1993, *The Forsaken* (DS9), 1993, *Invasive Procedures* (DS9), 1993, *Rules of Acquisition* (DS9), 1993, *Necessary Evil* (DS9), 1993, *Sanctuary* (DS9), 1993, *Rivals* (DS9), 1994, *The Alternate* (DS9), 1994, *Playing God* (DS9), 1994, *Armageddon Games* (DS9), 1994, *Profit and Loss* (DS9), 1994, *The Maquis: Part I* (DS9), 1994, *The Wire* (DS9), 1994, *The Jem'Hadar* (DS9), 1994, *The Search: Part I* (DS9), 1994, *The House of Quark* (DS9), 1994, *The Abandoned* (DS9), 1994, *Civil Defense* (DS9), 1994, *Meridian* (DS9), 1994, *Defiant* (DS9), 1994, *Fascination* (DS9), 1994, *First Born* (TNG), 1994, *Heart of Stone* (DS9), 1994, *Prophet Motive* (DS9), 1995, *Family Business* (DS9), 1995, *Facets* (DS9), 1995, *The Visitor* (DS9), 1995, *Hippocratic Oath* (DS9), 1995, *Rejoined* (DS9), 1995, *Starship Down* (DS9), 1995, *Little Green Men* (DS9), 1995, *Bar Association* (DS9), 1996, *Body Parts* (DS9), 1996, *Looking For Par'Mach in All the Wrong Places* (DS9), 1996, *Things Past* (DS9), 1996, *The Ascent* (DS9), 1996, *Rapture* (DS9), 1996, *The Darkness and the Light* (DS9), 1996, *The Begotten* (DS9), 1997, *Business as Usual* (DS9), 1997, *Ferengi Love Songs* (DS9), 1997, *In the Cards* (DS9), 1997, *Call to Arms* (DS9), 1997, *Favour the Bold* (DS9), 1997, *The Magnificent Ferengi* (DS9), 1997, *Who Mourns for Morn?* (DS9), 1998, *Change of Heart* (DS9), 1998, *In the Pale Moonlight* (DS9), 1998, *Profit and Lace* (DS9), 1998, *Afterimage* (DS9), 1998, *The Siege of AR-558* (DS9), 1998, *It's Only a Paper Moon* (DS9), 1998, *Someone to Watch over Me* (VOY), 1998, *Prodigal Daughter* (DS9), 1999, *The Emperor's New Cloak* (DS9), 1999, *The Dogs of War* (DS9), 1999, *Inside Man* (VOY), 2000, *Canamar* (ENT), 2003, *The Escape Artist* (STS), 2018, *The Impossible Box* (PIC), 2020

### **Lobi Crystal**

Lobi crystal is mentioned in a conversation by Ensign Kim while in an alternate reality in the Gamma quadrant. Episode: *Non Sequitur* (VOY), 1995

### **Neutronium**

A Hirogen in the Delta quadrant informed the crew of the *USS Voyager* that he knew of a collapsed neutron star whose mantle was composed of neutronium (the term astronomers use for collapsed matter consisting solely of neutrons). In studying the Kazis binary system in 2366, Doctor Paul Stubbs uses the decay of trace amounts of neutronium, implying it is a radioactive substance. Episodes: *Evolution* (TNG), 1989, *Prey* (VOY), 1998

### **Paralithium**

Paralithium is referred to as a material used in the production of Nausicaan disruptor pistols in the Alpha quadrant. It is also referred to on the M-class planet Kronos in the Beta quadrant. Episodes: *The Chute* (VOY), 1996, *Will You Take My Hand?* (DIS), 2018

### **Pergium**

The pergium mine at New Sydney is on the M-class planet Sapporo VII in the Alpha Quadrant, outside of Federation space. A large mine was also opened on the M-class planet Timor II in the same sector as the Sapporo system. Episode: *Prodigal Daughter* (DS9), 1999

### **Polyferranide**

A vein of polyferranide was found in pure form on a moon orbiting the M-class planet Drayan II in the Delta quadrant. A large polyferranide deposit on an uninhabited moon in the Delta quadrant was found mixed with astiline, forming a chalky white rock. Episodes: *Tattoo* (VOY), 1995, *Innocence* (VOY), 1996

### **Promethean Quartz**

The Promethean quartz crystal on board the DS9 space station was a misidentified biogenic substance that subsequently developed into a Gamma-quadrant life form. Episode: *Q-Less* (DS9), 1993

### **Rodinium**

Rodinium is mentioned in the discussion following an explosion at Deep Space 9. Episode: *The Maquis: Part I* (DS9), 1994

### **Ryetalyn**

Ryetalyn is a transparent violet mineral. Episode: *Requiem for Methuselah* (TOS), 1969

### **Sonodanite**

A mining shuttlecraft containing sonodanite crashed on the M-class moon Lambda Paz orbiting the M-class planet Pentarus III in the Alpha quadrant. Episode: *Final Mission* (TNG), 1990

### **Spican Flame Gem**

Spican flame gems were being offered for sale by merchant Cyrano Jones in 2267 on Deep Space Space Station K-7. Cyrano Jones is again encountered with these stones in 2269. Episodes: *More Tribbles, More Troubles* (TAS), 1973, *Trials and Tribble-ations* (DS9), 1996

### **Tellerium**

Tellerium is a yellow powdery mineral from a planet occupied by the Mokra Order in the Delta quadrant. Episode: *Resistance* (VOY), 1995

### **Tenebian Amethyst**

Considering its high value, the large faceted stone referred to as Tenebian “amethyst” is almost certainly not intended to be the well-known (and common) purple variety of quartz. It is more likely meant to be another rare, transparent purple mineral found on the Tenebian moons in the Alpha quadrant.<sup>10</sup> Episode: *These are the Voyages* (ENT), 2005

### **Thalmerite**

Thalmerite is an explosive placed on board a shuttle from the *USS Voyager* and then seized by a Numiri ship in orbit around the planet Banea in the Delta quadrant. Episode: *Ex Post Facto* (VOY), 1995



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<sup>10</sup> The original prop for Tenebian amethyst (approximately 2.5 × 3.25 inches) was sold at auction in 2008 for a reported \$1325. <http://startrekpropcollector.com/trekauctions/item.pl?i=9670>

*Figure 3. Trellium-D. Photo copyright 2004 by Paramount Pictures, all rights reserved.*

### **Trellium, Trellium-D**

Trellium (also called trellium-D) is a mineral produced at the North mine on a planet in the Delphic Expanse. It is also mentioned in conversations. Trellium-D can also be synthesised in a highly unstable liquid phase that solidifies to normal Trellium-D. Episodes: *Exile* (ENT), 2003, *Impulse* (ENT), 2003, *Stratagem* (ENT), 2004, *Home* (ENT), 2004

### **Trellium Ore**

The mineral trellium is found on asteroids in the Delphic Expanse; also referred to as trellium ore. Episode: *Impulse* (ENT), 2003

### **Trilithium**

Trilithium is a resinous material formed as a waste product of warp engines and is highly volatile. Episode: (*Starship Mine* (TNG), 1993)

### **Trillium 323**

Large deposits of trillium 323 are found on the M-class planet Caldonia in the Alpha(?) quadrant. Episode: *The Price* (TNG), 1989 [Trillium]

### **Vendarite**

Vendarite is found on the planet Ligos VII in the Alpha quadrant. Episode: *Rascals* (TNG), 1992

### **Veridium, Viridium**

Veridium (or viridium) is a gray, granular rock mined under a city on the Easter Continent of the M-class Akaali home world in the Alpha quadrant. The two spelling variants apply to the same substance. As with other ores in economic geology, the name applies to the mineral and also to the ore of the mineral from which the element is obtained. It is naturally occurring and may be in an impure native form from which the element is extracted with multiple isotopes. Since the mineral has the ability to be tracked at great distances, the Romulan Tal Shiar mole – Commodore Oh – gave an extract of it in pill form to an individual who then ingested it, allowing the Romulans to track the person. Apparently it could also be used to fuel a Delta Flyer on the *USS Voyager*. Episodes: *Riddles* (VOY), 1999, *Drive* (VOY), 2000, *Civilization* (ENT), 2001, *Broken Pieces* (PIC), 2020

## ***Legitimate (non-fictional) Minerals and Rocks***

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### **Amethyst**

The well-known purple variety of quartz was also mentioned in a discussion with Klingon Chancellor L'Rell on Kronos. Episode: *Point of Light* (DIS), 2019



**Figure 4.** Amethyst geode seen in Lieutenant Commander La Forge's cabin on board the *USS Enterprise* and again in the mining office on Sappora VII. Photo copyright 1992 and 1999 by Paramount Pictures, all rights reserved.

### **Cadmoselite**

A sand that was found to contain selenium-rich cadmium sulfide was found on Velara III in the Pleiades Cluster in the Alpha quadrant. In the non-fiction world this would be a mixture of the minerals greenockite and cadmoselite. The Star Trek version, however, must be biogenic. Episode: *Home Soil* (TNG), 1988) [Silicon Crystals]

### **Coal**

Coal was used in a metal forge supplied by the Klingons to the villages of the M-class planet Neural, 3rd planet in the Zeta Boötis System in the Alpha quadrant. It was also referred to in a conversation. Episodes: *A Private Little War* (TOS), 1967, *Emergence* (TNG), 1994, *Bar Association* (DS9), 1996

### **Corundum**

As part of an elaborate illusion, Captain Kirk is offered a bribe by an alien on the M-class planet Pyris VII in the Alpha quadrant; the alien is unaware that ruby (*i.e.* chromium-rich corundum) is no longer considered valuable. Episode: *Cat's Paw* (TOS), 1967

### **Diamond**

As part of an elaborate illusion, Captain Kirk is offered a bribe by an alien on the M-class planet Pyris VII in the Alpha quadrant; the alien is unaware that diamonds are no longer considered valuable. It is also mentioned in conversations. Episodes: *Cat's Paw* (TOS), 1967, *The Paradise Syndrome* (TOS), 1968, *Time's Arrow: Part I* (TNG), 1992

### **Emerald**

As part of an elaborate illusion, Captain Kirk is offered a bribe by an alien on the M-class planet Pyris VII in the Alpha quadrant; the alien is unaware that emerald (*i.e.* chromium-rich beryl) is no longer considered valuable. Emerald was mentioned as part of a piece of jewelry by Commander Data. Episodes: *Cat's Paw* (TOS), 1967, *Elementary Dear Data* (TNG), 1988

### **Gold**

In 2268, during a discussion of the material characteristics of a gaseous entity on Argus X in the Argus system, Spock mentions gold, lead and ivory to Captain Kirk. On the M-class planet Delphi Ardu IV in Tkon space in the Alpha quadrant, a Ferengi recognizes that the Enterprise communicators are made of gold, which they consider valuable. In 2368, the Ferengi Par Lenor claims that Ludugial Gold is the purest in the system within the Alpha quadrant, and during negotiations for the Bazaran Wormhole they still considered it valuable. Gold is still highly valued on an unnamed L-class (marginally habitable by humans)

planet orbiting an F-class (white) star in the Delta quadrant. Episodes: *Obsession* (TOS), 1967, *The City on the Edge of Forever* (TOS), 1967, *The Last Outpost* (TNG), 1987, *The Price* (TNG), 1989, *Captain's Holiday* (TNG), 1990, *Past Prologue* (DS9), *Time's Arrow: Part I* (TNG), 1992, 1993, *Babel* (DS9), 1993, *Q-Less* (DS9), 1993, *If Wishes Were Horses* (DS9), 1993, *The Perfect Mate* (TNG), 1995, *Muse* (VOY), 2000

### **Granite**

Granite was found on the M-class planet Turkana IV. The planet's bedrock consists of a layer of solid Granite 2 km thick. It was also seen forming cliffs in caves on the uninhabited M-class planet Celtris III in Cardassian space in the Alpha quadrant. Granite was also found in a cave used by the Vidiians and on an unnamed planet colonized by Entharans in the Delta quadrant. Episodes: *Legacy* (TNG), 1990, *Chain of Command: Part I* (TNG), 1992, *Faces* (VOY), 1995, *Retrospect* (VOY), 1998

### **Halite**

Common table salt (halite) is mentioned in a number of conversations. Nelix also mentions sea salt from the Nimian M-class planet in the Delta quadrant. It is also used on board *USS Discovery* in the Alpha quadrant. Episodes: *Dax* (DS9), 1993, *Nor The Battle To The Strong* (DS9), 1996, *Prototype* (VOY), 1996, *Waltz* (DS9), 1998, *Human Error* (VOY), 2001, *An Obol For Charon* (DIS), 2019 [Salt]

### **Hematite**

A deposit of hematite was found in a cave on an unnamed M-class planet in the Orellius system about 160 million kilometers from Orellius Minor in Sector 401 in the Alpha quadrant. It was apparently associated with magnetite, as Chief O'Brien broke off a piece of hematitic stone in the cave to use as a compass needle. It is also mentioned indirectly by an astronaut orbiting Mars. Episodes: *Paradise* (DS9), 1994, *One Small Step* (VOY), 1999

### **Ice**

Ice is mentioned in a conversation by Captain Picard on board the *Enterprise*. It is also mentioned in a conversation by Odo on board Deep Space 9. Jadzia Dax mentions ice cliffs at Tenara on the M-class planet Trill in the Alpha quadrant. Ice also occurs associated with silithium in a comet near the opening of the Bajoran wormhole in the Gamma quadrant. A Kuiper Belt field in the Alpha quadrant consists entirely of ice asteroids from a broken up comet. Ice was mined by Talaxians on an unnamed, mineral-rich asteroid in a field controlled by an alien race of miners in the Delta quadrant. It occurs as massive formations, some of which are mined, and in caves in the Polar Regions on the M-class planet Andoria in the Beta quadrant, as well as in glaciers on the planet Busala Prime in the Alpha quadrant. Episodes: *A Matter of Time* (TNG), 1991, *The Alternate* (DS9), 1993, *Equilibrium* (DS9), 1994, *Destiny* (DS9), 1995, *Treachery Faith and the Great River* (DS9), 1998, *Homestead* (VOY), 2001, *Canamar* (ENT), 2003, *United* (ENT), 2005, *The Aenar* (ENT), 2005, *The Vulcan Hello* (DIS), 2017, *Brother* (DIS), 2019

### **Iridium, Iridium Ore**

Captain Merik landed on M-class planet 892-IV in the Alpha quadrant to search for iridium ore. The ore is also mined on an unnamed asteroid in the Delta quadrant. Commander Tuvok refers to its "half-life," implying that it contains one or more radioactive iridium isotopes. Episodes: *Bread and Circuses* (TOS), 1968, *Critical Care* (VOY), 2000

### **Iron**

The asteroid, on which Earth observation post IV is located, next to the Neutral Zone, is composed primarily of iron. The rogue planet Gothos, which is located in a deserted area of quadrant 904, is composed of a mixture of iron and silica. Iron (as highly magnetic ferric Iron plus other unidentifiable elements) also occurs as nucleonic particles found within a polaric field located in the Delphic Expanse in the Alpha quadrant. It was referred to occurring mixed with nickel as in an asteroid approaching the Nezu home world

in the Delta quadrant. Episodes: *Balance of Terror* (TOS), 1966, *The Squire of Gothos* (TOS), 1966, *Rise* (VOY), 1997, *Similitude* (ENT), 2003

### **Iron Oxide**

The crew of an Earth vessel orbiting Mars refers to the “iron oxide” layer. Given what is known about the mineralogy of Mars, this must be a reference to hematite. Episode: *One Small Step* (VOY), 1999 [Hematite]

### **Magnesite**

The crust of an uncharted planet used by the Vidiians in the Delta quadrant has rich magnesite deposits. Raw magnesite ore was discovered by drilling occurred on the M-class planet Atrea IV in the Alpha quadrant. Dense magnesite formations were surveyed on the third planet in the Avery system in the Delta quadrant. It is also found in the rock faces of an underground hospital on the M-class planet Ajilon Prime in the Alpha quadrant. Magnesite also occurred on the destroyed M-class planet Uxal in the Delta quadrant, where it gave some protection against radiation. It also occurs as accumulated dust on Arakis Prime in the Delta quadrant. Episodes: *Inheritance* (TNG), 1994, *Faces* (VOY), 1995, *The Cloud* (VOY), 1995, *Nor The Battle To The Strong* (DS9), 1996, *One Small Step* (VOY), 1999, *Friendship One* (VOY), 2001

### **Nickel**

Nickel-iron was referred to as the composition of an asteroid approaching the Nezu home world in the Delta quadrant. Episode: *Rise* (VOY), 1997

### **Platinum**

The lack of platinum on the M-class planet Angel I in the Alpha quadrant is a fact that was used to find a human who carried an item made from Platinum. It is also mentioned as a precious metal in conversation. Episodes: *The City on the Edge of Forever* (TOS), 1967, *Angel One* (TNG), 1988

### **Quartz**

On the M-class planet Delphi Ardu IV in Tkon space in the Alpha quadrant, small actual quartz crystals (although not mentioned in the script) are visible on one ledge. The “tetrahedral quartz” that forms a mantle 20 kilometers thick on the planet Sikaris in the Delta quadrant is also referred to simply as “quartz.” One can consider it to be an alternate Star Trek name for massive (hexagonal) quartz. Episodes: *The Last Outpost* (TNG), 1987, *Prime Factors* (VOY), 1995

### **Shale**

Shale is mentioned in a conversation to describe a color. The word “shale” is used to mean “a lie” by the human inhabitants of the M-class planet Terra Nova in the Alpha quadrant. Episodes: *Jetrel* (VOY), 1995, *Terra Nova* (ENT), 2001

### **Silicon**

A silicon-based life form is recalled by Sulu while on the Kalendan outpost in the Alpha quadrant. It also occurs in the sand on Velara III in the Pleiades Cluster in the Alpha quadrant. Episodes: *That Which Survives* (TOS), 1969, *Home Soil* (TNG), 1988

### **Silicon Crystals**

“Silicon crystals” is an incorrect name given for a life form on Velara III in the Pleiades Cluster in the Alpha quadrant. However, it is described as “sand,” and seems to be a mixture of several chemical compounds that somehow combine to form an unrecognized life form. These compounds are silicon, germanium, gallium arsenide, and cadmium selenide-sulfide mixed with undescribed sodium salts and other impurities. Episode: *Home Soil* (TNG), 1988 [Silicon, Germanium, Gallium Arsenide, Greenockite, Cadmoselite, Sodium Salts]

## **Sodium Salts**

The sand that was found on Velara III in the Pleiades Cluster in the Alpha quadrant was found to contain sodium salts. There are various minerals that could be considered a sodium salt but they are not specified here. The Star Trek version, however, must be biogenic. Episode: *Home Soil* (TNG), 1988 [Silicon Crystals]

## **Sulphur**

Sulphur (the spelling used in the scripts) was used to make gunpowder supplied by the Klingons to the villages of the M-class planet Neural, 3rd planet in the Zeta Boötis System in the Alpha quadrant. Sulphur also occurs on the Klingon-inhabited planet of Gorath in the Alpha quadrant, as well as sulphur mines, sulphur-rich dunes on the Y-class (Demon-class) planet Ha'Dara and in lagoons on the planet Hokath in the Delta quadrant. It also occurred on the proto-Earth together with volcanic ash, and together with ash from a volcano on the M-class planet Kronos (the Klingon home world) in the Qo'noS system in the Beta quadrant. A Yridian trader aboard Deep Space 9 giving directions to Lieutenant Worf to find a Romulan prison camp on the M-class planet Carraya IV in the Beta quadrant indicates a sulphur canyon that would be passed on the way to the camp. Episodes: *Arena* (TOS), 1967, *A Private Little War* (TOS), 1967, *Birthright: Part I* (TNG), 1993, *All Good Things: Part I* (TNG), 1994, *Distant Origin* (VOY), 1997, *Day of Honor* (VOY), 1997, *Life Line* (VOY), 2000, *Flesh and Blood: Part II* (VOY), 2000, *Will You Take My Hand?* (DIS), 2018

## **CORRECTIONS TO PREVIOUSLY LISTED NAMES**

Some descriptions in the previous two articles are not in accurate accord with the episodes in which they occur. A few corrections are offered below.

### **Arcybite Ore**

Correct reference: Episode: *Ferengi Love Songs* (DS9), 1997

### **Beryllium, Beryllium Crystal<sup>11</sup>**

On *Voyager*, “beryllium” is described as a dark red translucent gemstone that is considered to be of very great value in Spatial Grid 539 in the Delta quadrant. Although it is not specifically referred to as “beryl” by Seven of Nine, it is clearly not the metal we know as beryllium. Because non-gem-grade beryl is sometimes used as an ore of beryllium, it seems likely to be the same mineral—perhaps the red beryl gem variety “bixbite.”<sup>12</sup> Episode: *Alice* (VOY), 1999 [Beryl]

### **Cornaline<sup>13</sup>**

Minable cornaline was found a few kilometres beneath the surface of Torga IV in the Gamma quadrant. Episode: *The Ship* (DS9), 1996

### **Magnesite Ore**

Magnesite is referred to as “magnesite ore.” It is also referred to as such where it was illegally mined by Klingons on the planet Kalla III in Pakled space in the Alpha quadrant. Episodes: *Inheritance* (TNG), 1993, *First Born* (TNG), 1994

### **Mizanite Ore**

Mizanite is referred to as “mizanite ore.” Episode: *The Nagus* (DS9), 1993

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<sup>11</sup> de Fourestier (2005), p.13

<sup>12</sup> de Fourestier (1999), p.43

<sup>13</sup> de Fourestier (2005), p.10

### **Murinite<sup>14</sup>**

Murinite is a grayish-black mineral used to make the handle of a knife found on Argellius II. However, the knife was actually made by the hill people in the Argus River region on Rigel IV in the Alpha quadrant, implying that it is found there instead. Episode: *Wolf in the Fold* (TOS), 1967

### **Promethean Quartz<sup>15</sup>**

Promethean quartz is referred to in a conversation on Deep Space 9; it apparently looks similar to an Albeni Meditation Crystal. The naturally occurring unnamed crystal, found in the Gamma quadrant, is an extremely valuable mineral that displays cathodoluminescence and houses an embryonic life form. A specimen of Promethean quartz, however, is never shown. Episode: *Q-Less* (DS9), 1993

## **NEW ADDITIONS TO THE LIST OF MINERALS**

As in the previous two articles, the following list of new entries is divided into two main categories: “Fictional Minerals” and “Legitimate (non-fictional) Minerals.”

A new section for “unnamed” or “unknown” minerals has been added at the end, as in some episodes objects that are clearly minerals but are otherwise undescribed are used as props. These are more difficult to track in the episodes but are included as best as possible. Some minerals can be visually identified in the series and, unless named as some fictitious mineral, they will also be included below; however, they are not included in the totals in Table 1.

### ***Fictitious Minerals***

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#### **Albeni Meditation Crystal**

This crystal<sup>16</sup> of unknown origin was given as a gift to the leader of the M-class planet Angel I in the Alpha quadrant by Commander Riker, indicating that such crystals are found in Federation space. Being an official gift implies that they have value. It displays a yellow cathodoluminescence. Episode: *Angel One* (TNG), 1988.

#### **Antonium**

Antonium is an undescribed mineral occurring in a layer that runs along the edge of a canyon on an unnamed planet in the Delta quadrant. Episode: *Tinker Tenor Doctor Spy* (VOY), 1999

#### **Benamite Crystal**

An alternate spelling. Episode: *Timeless* (VOY), 1998)

#### **Brizene Nitrate**

Brizene nitrate is referred to as being used as a fertilizer by Ferengi; it is likely a mineral, as it can be obtained in large quantity and at low cost in the Alpha quadrant. Episode: *Rules of Acquisition* (DS9), 1993

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<sup>14</sup> *Ibid.*, p.18

<sup>15</sup> The same prop occurs, also as a valuable item, in the episode *Angel One* (TNG), 1988.

<sup>16</sup> The prop used in the episode was also used for another purpose in an episode of *Deep Space 9*. In the episode it is mistaken for Promethean Quartz but said to have a higher density and index of refraction. Episode: *Q-Less* (DS9), 1998.



**Figure 5 (left).** Crystalline trees surround Commander Riker, Lieutenant Commander Data and three Ferengi during their first encounter on Delphi Ardu IV.

**Figure 6 (right).** Commander Burnham standing next to crystalline trees on Pahvo. Photo copyright 1989 & 2017 by Paramount Pictures, all rights reserved.

### Crystalline Tree

Large glowing groups of grayish hexagonal crystals that absorb energy are found on the M-class planet Delphi Ardu IV in Tkon space in the Alpha quadrant. Another crystalline tree – a vine-like tree covered in blue prismatic crystals – acted as a planetary transmitter on the M-Class planet Pahvo in the Beta quadrant. Episodes: *The Last Outpost* (TNG), 1987, *Shades of Gray* (TNG), 1989, *Si Vis Pacem, Para Bellum* (DIS), 2017



**Figure 6.** A crystal of dark matter that did not contain metreon-charged particles, from an interstellar asteroid. Photo copyright 2019 by Paramount Pictures, all rights reserved.

### Dark Matter

Dark matter is the component of the universe which is normally not visible in space and does not interact with electromagnetic radiation but still has a gravitational influence on other matter. In the Star Trek Universe it was first discovered in particle form in the Robinson Nebula in the year 2153. Subsequently, it was discovered in massive form on an interstellar asteroid in 2257. The asteroid had a sufficient mass to maintain an atmosphere. It also had ice on its surface.

The asteroid itself was composed of at least two types of dark matter. One kind occurs as relatively low-density hand-sized black terminated prismatic opaque crystals that could be picked up but not beamed through a transporter. The second type of dark matter contains metreon-charged particles that make the dark matter hyper-dense giving the asteroid such great mass.

The crew of the *USS Voyager* discovered another dark matter asteroid in 2376 in the Delta quadrant; it emitted electromagnetic radiation and caused gravimetric distortion. Episodes: *One Small Step* (VOY),

1999, *First Flight* (ENT), 2003, *Magic to Make the Sanest Man Go Mad* (DIS), 2017, *New Eden* (DIS), 2019, *Point of Light* (DIS), 2019 [Metreon-Charged Dark Matter]

### **Deuterium Ore**

On an unnamed M-class planet in the Delta quadrant, a member of the crew was on his way to excavate a rich vein of deuterium ore (deuterium is an isotope of hydrogen that has one proton and one neutron in its nucleus, and thus has twice the mass of ordinary hydrogen). Unlike other references to deuterium, in this case it is contained in a solid hand-minable mineral from which it can be extracted. It is also produced at a mining colony on an unnamed M-class planet in the Alpha quadrant, where it is recovered in gaseous form from which deuterium is refined (it is not clear if it is contained in another substance or mixed with regular hydrogen gas). It is also referred to from an unnamed location in the Delta quadrant, as well as on a Y-class planet in the Vaskan sector in the Delta quadrant. A further reference is made to large quantities that are available on the Planetoid Essof IV. Episodes: *Demon* (VOY), 1998, *Equinox: Part II* (VOY), 1999, *Bliss* (VOY), 1999, *Marauders* (ENT), 2002

### **Diamagnetic Mineral**

Diamagnetic minerals (that is, minerals repelled by a magnetic field) were found in igneous rocks of an unnamed moon orbiting an unnamed gas giant in the Arkonian system in the Beta quadrant. It is referred to in the plural, implying that there is more than one species included under this name. Episode: *Dawn* (ENT), 2003

### **Dilithium (polymorph)**

The crew of the *USS Voyager* discovered a new polymorph of crystalline dilithium on an asteroid in the Delta quadrant, although the exact source is not mentioned. This new polymorph made transwarp speeds possible. Episode: *Threshold* (VOY), 1996

### **Duranite**

Duranite is mentioned in a conversation in sickbay aboard the *USS Enterprise*. Duranite caps need to be stripped off of wires, implying that they are some sort of protective coating. Other than that there is no other description. Episode: *The Aenar* (ENT), 2005

### **Elanin Singer Stone**

Elanin Singer Stones are an undescribed mineral found in the Alpha quadrant; it looks like Carnelian Agate but emits a sound when held. Episode: *Pen Pals* (TNG), 1989

### **Illium-629**

The element Illium-629 (alternate spelling) is formed by the de-crystallization of dilithium, and consequently may be either an amorphous polymorph of dilithium or more likely a substance exuded through the breakdown or alteration of dilithium. As such it would be a native element. It is also found on the remains of Drema V. Episode: *Pen Pals* (TNG), 1989

### **Jewel of Thesia**

The Jewel of Thesia is a colorless gemstone of great value from the M-class planet Straleb in the Omega Sagitta system in the Alpha quadrant. Episode: *The Outrageous Okona* (TNG), 1988

### **Katra Stone**

A katra stone is an otherwise undescribed stone that can block the telepathic abilities of Vulcans on the planet Vulcan in the Beta quadrant. Episodes: *Equinox: Part I* (VOY), 1999, *Light and Shadows* (DIS), 2019

### **Kemocite Ore**

“Kemocite ore” is an alternate term for kemocite used by a member of the crew of the *USS Equinox* in a discussion of the ship’s manifest while in the Delta quadrant. Episode: *Light And Shadows* (DIS), 2019

### **Kevas**

To avoid capture, Spock posed as a trader of kevas and trillium while on Organia. According to the *The Star Trek Encyclopedia*, a kiva is a gemstone traded on Organia but otherwise undescribed. Episodes: *Errand of Mercy* (TOS), 1966, *Trials and Tribble-ations* (DS9), 1996

### **Magneside**

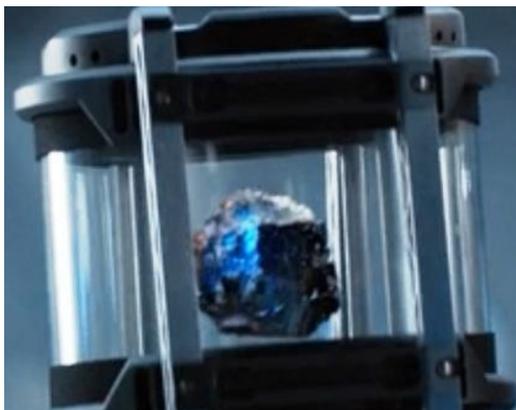
Magneside was found as a component of dust from inside an uncharted nebula in the Delta quadrant. It is identified by Lieutenant Tuvok as dust attaching itself to the hull, indicating he knows this mineral from nature. It may be of biogenic origin in this case. Episode: *The Cloud* (VOY), 1995

### **Magnesite Rock**

The Ferengi Rom uses magnesite rocks for their incendiary qualities; apparently they combust like sodium metal in water. This quality is very different from actual magnesite ( $MgCO_3$ ) and different from the magnesite mentioned in other episodes, implying that it is a different mineral—although metallic magnesium is indeed combustible in an oxygen atmosphere. Episode: *Necessary Evil* (DS9), 1993

### **Metreon-Charged Dark Matter**

Metreon-charged dark matter was discovered on an interstellar asteroid in the year 2257. The dark matter that contained metreon-charged particles made it hyper-dense giving the asteroid enough mass to retain an atmosphere. It is luminescent and appears more metallic, with a density estimated at 5,000 kg (about 11,000 pounds) per cubic centimeter. Episode: *New Eden* (DIS), 2019 [Dark Matter]



*Figure 7. Fragment of dark matter containing metreon-charged particles from an interstellar asteroid. Photo copyright 2019 by Paramount Pictures, all rights reserved.*

### **Monocaladium**

Monocaladium is a naturally occurring mineral found in a cave on Melona IV in the Alpha quadrant, associated with fistrium and kelbonite. Episode: *Silicon Avatar* (TNG), 1991

### **Nucleonic Particle**

Mineral substance found within a polaric field located in the Delphic Expanse in the Alpha quadrant. It is composed of highly magnetic ferric iron, as well as other unidentified elements. Episode: *Similitude* (ENT), 2003 [Iron]

## **Perchlorate Dust**

Perchlorate dust occurs in the atmosphere of the planetoid Essof IV. As it is in dust form, there is the implication that either it precipitates from the extremely cold atmosphere or it is wind-eroded from surface deposits. Either way, this would qualify it as a mineral (stable under the geological conditions on the planetoid).

The term “perchlorate” refers to a  $\text{ClO}_4$  radical with a negative valence. To form a compound it must combine with a positively charged radical. The necessary radical or radicals are not specified, therefore perchlorate dust may be a mixture of more than one perchlorate compound and consequently might represent a mineral group. Episode: *The Red Angel* (DIS), 2019

## **poH qut**

*PoH qut* is the Klingon name for Time Crystals found on the M-class planet Boreth of the Klingon Empire in the Beta quadrant. Episode: *Through the Valley of the Shadows* (DIS), 2019 [Time Crystal]

## **Raw Duratanium**

Raw duratanium is discussed in the same context as dilithium ore, implying that in this form it is also an ore of metallic duratanium. Episode: *Oasis* (ENT), 2002)

## **Rubidium**

In the Star Trek Universe, “rubidium” is a rare, gray, crystalline mineral found in a single geode on the Saowin home world in the Delta quadrant. Because of its rarity and form, it appears to be used as a decorative object meant to be kept in its natural form. (In the non-fiction world, of course, rubidium is an element.) Episode: *Think Tank* (VOY), 1999

## **Silicon Crystals**

“Silicon crystals” is an incorrect name given for a life form on Velara III in the Pleiades Cluster in the Alpha quadrant. However, it is described as “sand,” and seems to be a mixture of several chemical compounds that somehow combine to form an unrecognised life form. These compounds are silicon, germanium, gallium arsenide, cadmium selenide-sulfide mixed with undescribed sodium salts with other impurities. Episode: *Home Soil* (TNG), 1988 [Silicon, Germanium, Gallium Arsenide, Greenockite, Cadmoselite, Sodium Salts]

## **Stone of J’Kah**

This name is given to a stone that has been designated as a religious artifact by Vulcan monks on the M-class planet P’Jem in the Alpha quadrant, between the M-class planet Vulcan and the M-class moon Andoria in the Beta quadrant.<sup>17</sup> It is a black opaque stone that may be a meteorite. It is not uncommon that meteorites in the past were considered to have religious significance as a stone that has fallen from the “heavens.” Episode: *The Andorian Incident* (ENT), 2001

## **Thallium Compound**

A thallium-containing mineral was found in caves within karst formations on the M-class planet Mintaka III in the Alpha quadrant. It has a property that can interfere with a ship’s scanners. Episode: *Who Watches the Watchers* (TNG), 1989

## **Thermalyte**

Although the term thermalyte refers to an explosive, the suffix “-lyte” can also occur in mineral names. In the non-fiction world the name “Thermalite” is the brand name for an explosive fuse as well as the name for a type of construction material. Episode: *Homestead* (VOY), 2001

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<sup>17</sup> Some references place these planets and the moon in the Alpha quadrant, which conflicts with the published star charts that place all of them grouped together in the Beta quadrant. Mandel, p.52, 60

## Time Crystal

Time crystals are a rare, blue, luminescent mineral with an unstable crystal structure found on the M-class planet Boreth of the Klingon Empire in the Beta quadrant. They appear in the form of long, prismatic, transparent, crystals with pyramidal terminations identifiable by their orthogonal indices. Mined from volcanic rocks on Boreth, they are preserved and protected in a Klingon monastery on the planet. The followers of Kahless built the monastery of Boreth near several lava tubes containing the rare mineral native to the planet. By legend they can give visions of the future and make time travel possible, which would make them more fantastic than dilithium. Harry Mudd managed to obtain a device with a stabilized time crystal permitting him to jump back in time. The concept of time crystals in physics was first described by Nobel laureate Frank Wilczek in 2012. They are incorrectly called “Boreth Crystals.” Episodes: *Magic to Make the Sanest Man Go Mad* (DIS), 2017, *The Red Angel* (DIS), 2019, *Through the Valley of the Shadows* (DIS), 2019, *Perpetual Infinity* (DIS), 2019, *Such Sweet Sorrow: Part I* (DIS), 2019, *Such Sweet Sorrow: Part II* (DIS), 2019 [poH qut]



**Figure 8.** Time crystals *in situ* amongst pillars of columns of igneous rock on Boreth (*left*) and a separate crystal taken from Boreth (*right*). Photo copyright 2019 by Paramount Pictures, all rights reserved.

## Tractosite

Tractosite was collected by a Denoblian team of geologists in a cave on the planet Xantoras in the Alpha quadrant. Episode: *The Breach* (ENT), 2003

## Traker

Traker is an undescribed indicator mineral found in deposits associated with dilithium on the M-class planet Drema IV in the Selcundi Drema system during a mineral survey by the *USS Enterprise*. Episode: *Pen Pals* (TNG), 1989

## Trilithium Ore

Trilithium ore is a black, massive, coal-like mineral found in the Delta quadrant. It is a natural source of trilithium used in the manufacture of an explosive. Because trilithium can be synthesized from paralithium, it may be a polymorph. Episode: *Course: Oblivion* (VOY), 1999

## Trillium<sup>18</sup>

In the non-fiction world, “trillium” is a varietal term for green gem-quality fluorapatite, but in the Star Trek universe it is clearly intended to be a different mineral. To avoid capture, Spock posed as a trader of kevas and trillium while on Organia. Large deposits of trillium are found on the M-class planet Caldonia in the Alpha quadrant. A surgically altered Klingon posing as a trader mentions that he sells gemstones and trillium while at Deep Space Station K-7. Episodes: *Errand of Mercy* (TOS), 1966, *The Price* (TNG), 1989, *Trials and Tribble-ations* (DS9), 1996 [Trillium 323]

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<sup>18</sup> “Trillium” is also the name of the three-petalled provincial flower of Ontario, Canada. de Foustier (1999), p.358

### **Tritanium**

Molten Tritanium was found on the M-class planet Minos in the Lorenze Cluster in the Alpha quadrant. An alien life form from the Alpha quadrant can use its mycelia to decompose tritanium used in the construction of a hull. Episodes: *The Arsenal of Freedom* (TNG), 1988, *Where Silence Has Lease* (TNG), 1988, *Matter of Honor* (TNG), 1989, *In the Hands of the Prophets* (DS9), 1993, *Saints of Imperfection* (DIS), 2019, *Such Sweet Sorrow: Part I* (DIS), 2019, *The End is the Beginning* (PIC), 2020

### **Ultritium**

Ultritium was mined on a rocky moon orbiting a gas giant planet in the Gamma quadrant. The mine was converted to Internment Camp 371. Enriched ultritium is used to make explosives, suggesting that the material is unstable. It is mentioned in several episodes. Episodes: *Manhunt* (TNG), 1989, *In Purgatory's Shadow* (DS9), 1997, *The Ship* (DS9), 1997, *A Time to Stand* (DS9), 1997



**Figure 9. Vokaya mounted in a necklace worn by Lieutenant Uhura. Photo copyright 2016 by Paramount Pictures, all rights reserved.**

### **Vokaya**

Vokaya is a turquoise-colored gemstone that emits a harmless radiation; it is found only on the planet Vulcan in the Beta quadrant of an alternate reality. Episode: *Star Trek Beyond* (MPF), 2016

### **Winter's Tears**

"Winter's tears" is the name for dilithium among the local inhabitants of an unnamed L-class (Marginal) planet (the fourth) orbiting an F-class (White) star in the Delta quadrant. Lieutenant Torres shows the entry on dilithium in the mineralogical database of *USS Voyager* to a native of the planet, who is able to obtain a large black crystalline mass. Episode: *Muse* (VOY), 1999 [Dilithium]

**Anthracite** C

Chief O'Brien mentions the anthracite mines in Pennsylvania on Earth during a conversation on the establishment of a union. Episode: *Bar Association* (DS9), 1996

**Clay**

Clay can refer to various unspecified minerals of the clay group. It is mentioned along with locations in the Alpha quadrant where it has been found by Federation officers. Episodes: *How Sharper Than a Serpent's Tooth* (TAS), 1974, *Progress* (DS9), 1993 [Mineralized Clay]

**Chromium** Cr, cubic

Chromium occurs along with magnesium and dilithium hydroxyl in the Paulson Nebula between Zeta Alpha II and Sentinel Minor IV in the Alpha quadrant. Episode: *The Best of Both Worlds: Part I* (TNG), 1990

**Gallium Arsenide** GaAs, cubic

The sand on Velara III in the Pleiades Cluster in the Alpha quadrant was found to contain gallium arsenide. It is totally feasible that such a mineral might exist somewhere in the non-fiction universe and would have a sphalerite structure (though it has yet to be found in nature). The Star Trek version, however, must be biogenic. Episode: *Home Soil* (TNG), 1988) [Silicon Crystals]

**Germanium** Ge, cubic

The sand that was found on Velara III in the Pleiades Cluster in the Alpha quadrant was found to contain germanium. It is totally feasible that somewhere in the universe germanium occurs in its native state, and would constitute a new mineral. The Star Trek version, however, must be biogenic. Episode: *Home Soil* (TNG), 1988) [Silicon Crystals]

**Greenockite** CdS, hexagonal

A life form on Velara III in the Pleiades Cluster in the Alpha quadrant was found to contain cadmium sulfide containing selenium. In the non-fiction world this would be a mixture of the minerals greenockite and cadmoselite. The Star Trek version, however, must be biogenic. Episode: *Home Soil* (TNG), 1988) [Silicon Crystals]

**Hydroxylapatite**  $Ca_5(PO_4)_3(OH)$ , hexagonal

Ivory, a gem material composed of biogenic hydroxylapatite (along with gold and lead), is mentioned by Spock to Captain Kirk in a discussion of the material characteristics of a gaseous entity on Argus X in the Argus system. Episode: *Obsession* (TOS), 1967

**Lead** Pb, cubic

In a discussion of the material characteristics of a gaseous entity on Argus X in the Argus system, Spock mentions gold, lead and ivory to Captain Kirk. Episode: *Obsession* (TOS), 1967

**Magnesium** Mg, hexagonal

Native magnesium occurs along with chromium and dilithium hydroxyl in the Paulson Nebula between Zeta Alpha II and Sentinel Minor IV in the Alpha quadrant. Episode: *The Best of Both Worlds: Part I* (TNG), 1990

**Marble**  $CaCO_3$ , hexagonal

Marble is a rock composed of massive calcite and it is mentioned in various conversations. Episodes: *The Royale* (TNG), 1989, *Brothers* (TNG), 1990, *Time's Arrow, part 1* (TNG), 1992, *Playing God* (DS9),

1994, *The Thaw* (VOY), 1996, *Star Trek: First Contact* (MPF), 1996, *Concerning Flight* (VOY), 1997, *Course: Oblivion* (VOY), 1999, *Memorial* (VOY), 2000

### **Mineralized Clay**

It is unclear which clay species this term refers to – perhaps kaolinite. It is found as masses in the ground of Jeraddo, the fifth moon orbiting Bajor in the Alpha quadrant. Episode: *Progress* (DS9), 1993 [Clay]

### **Native Sulphur** *S*, orthorhombic or monoclinic

An alternate term referring to sulphur that occurs in natural mineral form. Episodes: *Arena* (TOS), 1967, *Will You Take My Hand?* (DIS), 2018

### **Selenium** *Se*, hexagonal

Selenium was found on the M-class moon Lambda Paz orbiting the M-class planet Pentarus III in the Alpha quadrant, but it was not considered to be particularly valuable. It is also described as being used to create a weapon but its source location in that episode is not mentioned. Episodes: *Final Mission* (TNG), 1990, *For the Uniform* (DS9), 1997

### **Silica** *SiO<sub>2</sub>*, hexagonal or amorphous

Silica is a common synonym for quartz or opal. The Y-class planet Gothos, located in a deserted area of quadrant 904 in the Beta quadrant, is composed of a mixture of iron and silica. Since the temperature at which the two would mix would be high enough to melt the silica it would likely recrystallize as quartz if it cooled slowly or as lechatelierite if quenched quickly. Episode: *The Squire of Gothos* (TOS), 1966

### **Silver** *Ag*, cubic

Silver is mentioned as a precious metal in conversation. Episode: *The City on the Edge of Forever* (TOS), 1967

### **Speleothem**

Speleothems were being collected by Denobulan geologists in a cave on the planet Xantoras in the Alpha quadrant. Although in the non-fiction world this a valid term for cave formations of various secondary minerals (such as aragonite, calcite or gypsum—from the Greek word for “cave deposit”), it is used in one episode to mean a rare mineral that looks like transparent crystalline calcite. Episode: *The Breach* (ENT), 2003

### **Sylvite** *KCl*, cubic

During a fire, an avatar controlled by Lieutenant Commander Geordi La Forge mentioned “potassium chloride,” as being part of the gases it encountered. The implication is that it was in gaseous form; if crystallized in solid form it would be the mineral sylvite. Episode: *Interface* (TNG), 1993

### **Volcanic Ash, Ash**

Volcanic ash is a very fine-textured rock of varying composition that is deposited during volcanic eruptions. It was found by Q and Captain Picard on proto-Earth, together with pools of molten sulphur. After a Type C asteroid struck an unpopulated region on the M-class planet Penthara IV in the Alpha quadrant, the *USS Enterprise* inadvertently caused new volcanic activity that spewed volcanic ash into the atmosphere. It was also found together with sulphur near volcanos on the M-class planet Kronos (the Klingon home world) in the Qo’noS system in the Beta quadrant. It also covers a cormaline deposit found on the M-class planet Torga IV in the Gamma quadrant. Episodes: *A Matter of Time* (TNG), 1991, *All Good Things: Part I* (TNG), 1994, *The Ship* (DS9), 1996, *Will You Take My Hand?* (DIS), 2018

**Agate**

A large cross-section of a nodule is one of the mineral specimens on display in Captain Picard's ready room on board the *USS Enterprise*. Although it appears in many episodes it is never named or referred to. Episodes: *Numerous episodes, especially in the final seasons.*

**Malachite**

Malachite is among the mineral specimens on display in Captain Picard's ready room on board the *USS Enterprise*. Although it appears in many episodes it is never named or referred to. Episodes: *Numerous episodes, especially in the final seasons.*



**Figure 10. Shran's thunderegg geode. Photo copyright 2007 by Paramount Pictures, all rights reserved.**

**Thunderegg Geode**

A large geode lined with quartz crystals seen in Commander Shran's ready room. The specimen probably came from Oregon. Episode: *Proving Ground* (ENT), 2004

**Unknown (of Burnham)**

Two clusters of prismatic, milky lavender crystals of an unknown mineral can be seen on a shelf behind the young Michael Burnham's bed while she is being told a story by her father. Episode: *The Girl Who Made the Stars* (STS), 2019



**Figure 12. Burnham's crystals. Photo copyright 2019 by Paramount Pictures, all rights reserved.**

### **Unknown (of La Forge)**

Lieutenant La Forge found small crystalline pieces of a gray metallic mineral. The metal was hard enough to penetrate a rock wall, suggesting that it may have been small nickel-iron meteorites (taenite and kamacite) or perhaps nuggets of a platinum-group element. Episode: *The Enemy* (TNG), 1989



*Figure 13. Unidentified metallic mineral found by Lt. La Forge. Photo copyright 1989 by Paramount Pictures, all rights reserved.*

### **Unknown (of Picard)**

An unidentified crystal was used by Captain Picard when discussing various issues during meetings. Episodes: *Conspiracy* (TNG), 1988, *Where Silence Has Lease* (TNG), 1988, *Suddenly Human* (TNG), 1990, *A Matter of Time* (TNG), 1991, *The Masterpiece Society* (TNG), 1992, *Gambit, Part I* (TNG), 1993



*Figure 14. Unidentified crystal held by Captain Picard in his ready room. Photo copyright 1992 by Paramount Pictures, all rights reserved.*

### Unknown (of Suru)

An unknown green, glassy, transparent crystalline mineral was picked up off the ground by Captain Suru on the M-class planet Pahvo in the Beta quadrant. It apparently possessed some mystical qualities. Episode: *Si Vis Pacem, Para Bellum* (DIS), 2017



Figure 15. Unknown crystalline mineral held by Captain Suru. Photo copyright 2017 by Paramount Pictures, all rights reserved.

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### ABOUT THE AUTHOR

Jeffrey de Fourestier is a member of the Mineralogical Society of Great Britain & Ireland and has been a Fellow since 2001. He is also a Fellow of the Royal Society of Arts since 2019, and is the author of two editions of the *Glossary of Mineral Synonyms*. He is a former curator of geology at Concordia University and assistant to the curator of geology at the Redpath Museum at McGill University in Montreal, Quebec. In 1996 he was awarded the Meritorious Service Medal by Queen Elizabeth II.

Starting in 2005, Jeffrey de Fourestier has worked on a number of new mineral species and published various papers relating to the mineralogy of China (in English and Chinese) as well as numerous other papers related to the earth sciences. He presently sits on the editorial board of *Acta Mineralogica Sinica*,

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