



THE MINERALOGY OF STAR TREK

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While most mineralogy papers treat serious mineralogy, this paper will examine the mineralogy created for the imaginary universe of Star Trek in which many of us have grown up. It is meant for fun, but as Stephen Hawking wrote, “. . . today’s science fiction is often tomorrow’s science fact. The physics that underlies Star Trek is surely worth investigating. To confine our attention to terrestrial matters would limit the human spirit.” (Krauss, 1995).

INTRODUCTION

Of all the science fiction series that have become part of the popular cultural heritage of Western society, none rivals *Star Trek*. In fact this series, which first aired on NBC in the 1960's, has become a series of series with one animated series, followed by four spin-offs, and an extensive list of films (see: Table 1). In addition, numerous books also have been published, all tied to the same imaginary universe created by Gene Roddenberry and Paramount Studios almost 40 years ago. Unlike many other such programs, *Star Trek* made a serious effort at using real science and scientific theory to create its science fiction. While much remains in the realm of pure fantasy, what has become known as “Treknology” has given us, or at least inspired, computer diskettes, voice recognition and talking computers, *Star Trek*® communicator-style cell phones (by Motorola), electronic writing pads, tasers and particle beam weapons, not to mention a whole new vocabulary that has become part of the English language.

NASA physicist David Batchelor stated that, “A few of (my colleagues) imagine some hypothetical, perfectly accurate science fiction TV series and discredit *Star Trek* because of science errors or impossible events in particular episodes. This is unfair.” I agree with his further statement that “Generally *Star Trek* is pretty intelligently written and more faithful to science than any other science fiction series ever shown on television.” This, in my view, also applies to the “mineralogy of *Star Trek*.”

GEOLOGY

The general geology of a number of other worlds—planets, moons, asteroids and comets—is known, at least for our solar system. While it is possible that different conditions and, hence, different minerals will be found in these places, it is likely that they will adhere to the same basic geological processes and the chemistry of nature. Geology is pervasive in the Star Trek sagas. So much so that in the film *First Contact* and in the latest series incarnation *Enterprise*, one learns that earth's first alien contact is made with a Vulcan geologic survey team. Whether it is reference to the various mines in all the quadrants that Star Trek has gone, the geologic upheavals in the Star Trek movie *Search for Spock*, or even the lava-spewing volcanoes in the animated Star Trek series episode *The Terratin Incident*, the forces that create minerals throughout the universe are part of the underlying story line.

As with any fictional representation of its kind, the Star Trek representations do allow themselves some license. Some elements of the science are exaggerated or are complete inventions of the imagination, but not all. As a consequence of this, the imaginary minerals as well as the real minerals that are mentioned in the Star Trek stories range from the very probable to the completely far-fetched. For example, the chemical, crystallographic and other physical aspects attributed to certain minerals defy science. Yet, the premise that gold might be a relatively common, almost worthless metal to other civilizations seems perfectly feasible as there is no reason why it might not be more common on certain other planets than it is on ours.

NOMENCLATURE

The manner in which minerals are named, as well as the manner in which chemical elements are named, is very specific and follows certain general traditions and rules. Even the minerals that have thus far been found only on the moon or in meteoritic material follow these same rules. In the real world, mineral names are reviewed and approved by the Commission on New Minerals and Mineral Names of the International Mineralogical Association (IMA). It would be likely that any future civilization would also have a similar body to oversee the manner in which scientific names are given. In the same way as the very names given to the starships followed tradition, one would expect any scientific body to be as conservative.

Since the founding of the IMA in 1958, all mineral names, with only a few exceptions, end with the suffix “-ite.” The most common exception is “-ine.” Because Alfred Nobel named his invention “dynamite,” many names of explosives also end with the suffix “-ite.” These names, in theory, could be confused with names given to minerals and are, therefore, included as mineral-like names.

Chemical elements most commonly end with the Latin suffix “-ium” or simply “-um.” The suffixes “-on,” “-gen” and “-ine” also occur in the nomenclature of the periodic table. If a mineral is the naturally occurring form of a chemical element, then the element name is maintained for the mineral name as well. A similar procedure can be followed for some chemical compounds such as those ending with the suffix “-ide,” although this practice is rare.

Ores generally have mineral names (*e.g.*, hematite), unless they are accompanied by the word “ore.” In the latter, the word preceding the word “ore” usually represents the substance to be extracted from the ore (*e.g.*, iron ore).

There are no such rules for gemstones. While most gemstones also have an official mineral name if they result from a geologic process, the only rule for gemstone names is the success of the name in the marketplace. As a result, the names for gemstones can be very simple (*e.g.*, ruby) to more exotic (*e.g.*, oriental sapphire). The examples I used here are in fact for varieties of the same mineral—corundum.

Unfortunately these facts seem to have been lost on some of the writers of Star Trek. As a result, the names of minerals that are mentioned are a hodgepodge of pseudo-nomenclature that bears little resemblance to the names one would expect a true mineralogist or chemist to give to a new mineral or a new chemical element—no matter where they were found in the universe. The writers gave substances that are clearly minerals “-ium” endings that would normally indicate an

element, and in a few cases substances that are clearly meant to be elements were given "-ite" endings. I have therefore placed no particular significance on these endings in determining what was intended by the writers to be a mineral and what was supposed to be an element, relying instead in the context in which the terms were used.

SUPERHEAVY ELEMENTS

Although this paper does not specifically deal with general chemistry as used in Star Trek, it seems appropriate to make a few general comments on fictitious elements named in the various incarnations—a number of which are not in the list that follows, as they are not described in a manner that implies they are naturally occurring minerals. In the case of the fictitious element names referred to in the Star Trek universe, these are likely meant to refer to transuranium (transactinide) elements that remain undiscovered at the present time. These must therefore have atomic numbers larger than the heaviest currently known element. Nobel-prize-winning physicist Glenn T. Seaborg (1998) has stated that:

Present theory suggests that the maximum atomic number could be found to lie somewhere between 170 and 210, if nuclear instability would not preclude the existence of such elements... There has been, however, considerable speculation, based on a number of theoretical calculations, that an island of stability might exist in the neighborhood of $Z = 114$ and $N = 184$, both of which are thought to be magic numbers. Isotopes in this region, which theoretically should have significantly longer half-lives than the neighboring known heavy isotopes, are sometimes termed *superheavy elements*.

The concept of the possibility of there being stable superheavy elements having as-yet unknown physical properties is therefore based on solid science. Commenting further in this regard, Donal O'Leary (2000) has written:

In January [1999] a team of Russian and American physicists at the Joint Institute for Nuclear Research at Dubna, Russia, announced the creation of element 114. The physicists were able to produce just a single atom of the new element, an isotope containing 114 protons and 184 neutrons in its nucleus. Element 114 lasted an unprecedented "stable" 30 seconds, long enough to enable its detection, before breaking down (decaying) into lighter elements. Until this discovery, "superheavy" elements found had been unstable, with lifetimes measured in fractions of a second. For example, element 112, the last element discovered, has a life of just 280 milliseconds. The heavier the element, it seemed, the shorter its life. But for the last 30 years, theorists had predicted the existence of "an island of stability" occurring among the heavier elements—a group of stable elements living long enough to allow for studies of their nuclear behavior and chemistry. The significance of element 114 is its confirmation that scientists have finally landed upon the shores of the "island of stability" they had only hypothesized about.

Research continues to be encouraging in this area. In July 2004, physicist Yuri Oganessian of the Joint Institute for Nuclear Research in Dubna, Russia wrote:

We now have data on the properties of 29 new nuclei with atomic numbers between 104 and 118. The decay modes, energies and lifetimes of the heaviest nuclei all agree with the predictions of the microscopic nuclear model, which provides the first experimental evidence for an island of stability in superheavy nuclei. But we have only reached the shores of this island. We have found a steep rise in the stability of superheavy nuclei with atomic number, but we are still far from the region in which nuclei may live for thousands, maybe even millions, of years. The problem is that we

do not yet know how to make the neutron-rich nuclei that will take us towards the magic number $N = 184$. However, there could be a way round this. If the longest living superheavy nucleus has a half-life of tens of millions years then it should be present in very small quantities on Earth. The only difficulty then is finding it.

Therefore it is entirely possible that elements such as the fictitious beresium, diburinium, fisilium, fistrium, ilium, inertium, irillium, jakmanite, kelbornite, kellinite, latinum, nitrium, noranium, rodinium, silithium and sonodanite may yet be discovered in the distant future, perhaps on other planets.

“MINERALS” OF STAR TREK

There are approximately 125 minerals or mineral-like names mentioned throughout the incarnations of Star Trek. These minerals can be divided into two groups: those that really exist and those that were created out of the imaginations of the writers. Interestingly, the original series (TOS) has the closest split between the number of real minerals (11) mentioned in this series and the number of fictitious minerals or mineral-like names (17). When one considers the relative number of episodes to all the names that are mentioned in all of Star Trek and the fact that TOS had the smallest number of episodes of the main incarnations of Star Trek (*i.e.*, TOS, TNG, VOY, DS9, ENT), then one can conclude that TOS had the greatest reference to minerals in general and to real minerals in particular.

Table 1. Names of series & number of minerals & mineral-like names

ABBRE- VIATIONS	NAME OF SERIES	IN PRODUCTION	NUMBER OF NAMES
ANS	Animated series	1973-1974	n/a
DS9	Deep Space 9	1993-1999	38
ENT	Enterprise	2001-2005	15
MPF	Motion pictures	1979-present	6
TNG	The Next Generation	1987-1994	26
TOS	Original Series	1966-1969	28
VOY	Voyager	1995-2001	42

For the most part the minerals that are referred to in the various episodes are not shown and are simply mentioned in passing as part of the general dialogue, with a few exceptions. Among these exceptions are dilithium, latinum, silicon (Horta eggs), trellium-D, tritanium and the minerals that Captain Kirk scraped together in his battle with the Gorn Captain. It should be noted that almost all of the names just mentioned (aside from latinum and trellium-D) are from the original series. Since an effort was made to obtain certain materials as props, observation of the props have resulted in specific characteristics being attached to the names.

In total, only 23 real minerals are mentioned in one fashion or another. In fact, TOS with 11 has half of all real minerals mentioned throughout the series. In some cases, a synonym is used rather than the formal mineral name. As well, one multi-mineral rock and two single-mineral rocks are mentioned, as are at least one synthetic form and another biogenic, of a naturally occurring mineral. Considering that there are over 4,000 known minerals with a wide variety of colorful names and various attributes, this seems to be quite a small amount. Interestingly, none of the real names mentioned are for minerals known from space (with the exception of olivine). Also surprising is the fact that one of the most common minerals in the earth's crust, quartz, is mentioned for the first time during the second season of *Enterprise*, almost 36 years since the first episode of Star Trek aired in 1966! This, despite the fact that quartz has been used since the very beginning as a prop, albeit for dilithium.

In total, there are over four times as many fictitious names as there are real ones. Of the almost 100 fictitious minerals that are mentioned, over a third are mentioned on the *Voyager*

(VOY) series, which is the most of any series, followed closely by *Deep Space 9* (DS9). They were, however, two of the longest running series. The least number of references come from the various Star Trek motion pictures. Of those mentioned, one is the ubiquitous dilithium and it is worth discussing on its own.

DILITHIUM

The most famous and the first to be named of the imaginary “minerals” of Star Trek is dilithium. The only other fictitious mineral that is as well known a part of popular culture (albeit far less plausible) is Superman’s bane—*kryptonite*. While no such mineral as dilithium is ever likely to be found, this substance plays a key role in a not insignificant part of the entire concept of Star Trek. From the descriptions given it is definitely a mineral and is what made it possible for the *USS Enterprise* to “boldly go where no man has gone before.”

Dilithium was first mentioned on the fourth episode produced of TOS, called *Mudd’s Women*, which aired as the sixth installment of the first season on October 13, 1966. It plays an important role in this episode and during one scene Captain Kirk is seen holding a damaged crystal commenting on its beauty. It is obvious from the scene that he is holding a quartz crystal which was used as a readily available prop. For collectors of Star Trek memorabilia or of minerals, this specimen would have a value quite above its normal value as a crystal of one of the most common minerals on earth. What happened with this specimen is unknown. It should be noted, though, that in the episode mentioned it is referred to as *Lithium Crystal*. The Star Trek web sites make it very clear that lithium crystals were used as a predecessor for dilithium in early starship warp drives. As the *Enterprise* of TOS was not a ship equipped with early warp drives and that its science officer, Mr. Spock, eventually went on in a later episode to find a way to synthesize dilithium, one can only conclude that the reference on the episode was to dilithium as it became known in innumerable subsequent episodes.

Because of this mineral’s central role in the storyline, a whole mythology surrounds it. It is, however, a naturally occurring substance within the mythology, as there are various episodes that make reference to the mining of dilithium deposits. Besides the information contained in the abstract included in this article, there are a number of web sites and publications that give different and sometimes conflicting information about dilithium. One author cites it as the hardest known substance, although this honor actually goes to *roginium* in the series. NASA physicist Lawrence Krauss refers to it in his book as *2(5)6 Dilithium 2(:)1 Diallosilicate 1:9:1 Heptoferranide* (Krauss, 1995). This name itself is imaginary and gives no real information on the structure or make-up of this substance other than that this version of the name implies a lithium and iron-bearing aluminosilicate of some sort. That said, the real mineral that most closely matches the descriptive elements of this name is ferroholmquistite which is a dilithium triferrodiallosilicate. If one goes on the premise that nature follows certain general norms, then one could extrapolate that dilithium might have a similar number of silicon atoms in its structure. Keeping seven (i.e. hepto) ferrous irons and balancing the oxygens would give a theoretical formula of $\text{Li}_2\text{Fe}_7\text{Al}_2\text{Si}_8\text{O}_{27}$. A mineral with this composition could theoretically exist, although it is doubtful that it would possess the more fantastic properties ascribed to dilithium.

The main premise is that when dilithium is subjected to a high frequency electromagnetic field, it becomes porous to antimatter, and that it is the only substance known to possess this quality. Since passing through its crystal structure slows down or moderates the flow of the antimatter, dilithium can be used to moderate the reactions in the matter-antimatter reactors. Some scientists consider dilithium so imaginary that it is not worthy to discuss its hypothetical properties (Batchelor, 1993).

That said, it is known that certain minerals allow visible light to pass through their structures, slowing down the speed of transmission. The relative speed of light passing through such a crystal and the speed of light passing through air is known as the refractive index. It is a vital diagnostic characteristic in transparent minerals. If the antimatter passing through were in the form of anti-photons then one could infer that a transparent crystalline substance could be used to moderate the flow.



Figure 1. France Nguyen, as Elaan of Troyius, wearing a dilithium-crystal necklace. Photo copyright 1967 by Paramount Pictures, all rights reserved.

In fact, modern day experiments involving moderating the flow of positrons or “anti-electrons” have used tungsten crystals. Therefore, for this to be plausible, dilithium would need to be transparent and allow the transmission of certain types of antimatter, slow these particles down through the electromagnetic influences at the atomic level, but not allow the particles to come into contact with the matter of the crystal lattice through which the flow of antimatter particles is directed. Any contact would of course result in an unwanted form of propulsion—namely in all directions simultaneously. As a side note, the Fermi Lab engineers decided on using lithium as a target in their antiproton source (Krauss, 1995).

LIST OF MINERALS

The following list is divided into two parts. The first contains all fictitious minerals or mineral-like names, while the second part contains the names of real minerals referred to in Star Trek. The names in the first part contain what information could be found in the episodes that would normally be considered pertinent for the writing of an abstract on the mineral. Most of the names given have very little of this information and some of it varied throughout the episodes. A sample abstract for dilithium (see the Appendix) was created based on information obtained from several mineralogists and scientists. The information is pure conjecture but based on the properties of a real compound.



Figure 2. Leonard Nimoy (Mr. Spock) and William Shatner (Capt. Kirk) discussing the necklace of dilithium crystals. Photo copyright 1967 by Paramount Pictures, all rights reserved.



Figure 3. Leonard Nimoy (Mr. Spock) and James Doohan (Montgomery Scott) installing dilithium crystals in the *Enterprise* power converter. Photo copyright 1967 by Paramount Pictures, all rights reserved.

Because original scripts are not available, the actual spelling is not always known. This has resulted in some variation in the spellings used by various authors of the various “trekkie” web sites. For almost all the names I have managed to cite an episode but a couple of names were found without a reference to an episode.

The information given in the second part includes the important distinguishing information for all true minerals: namely the chemical formula and the crystallographic class. In addition there is a reference to the episode where the mineral was mentioned.

Fictitious Minerals

Acetin

Occurs in swamp beds near Alixus community on an unidentified planet in the Delta quadrant. It is also the name for a real compound which is a mixture of acetic acid and glycerin. Episode: *Paradise* (DS9), 1994 [alternate spelling—Astatine?]

Antimonium

Undescribed mineral whose value greatly diminished after 2373. Because of the apparent important value ascribed to this mineral, it is clearly not antimony, which is a real mineral. Episode: *Business as Usual* (DS9), 1997

Argonite

Potentially hazardous substance. Episode: *Dr. Bashir, I Presume?* (DS9), 1997

Astatine

Although the name of a real element, one web-site reports this as the spelling for acetin. Episode: *Paradise* (DS9), 1994 [alternate spelling—Acetin]

Astiline

This ore can taint polyferranide, making it useless. Episode: *Tattoo* (VOY), 1995

Baakonite

A strong, reinforced metal used for traditional Klingon weaponry such as the bat'leth. Episode: *Blood Oath* (DS9), 1994

Bakrinium

Substance mined in the Gamma quadrant by a Vulcan geological survey team. Episode: *The Sword of Kahless* (DS9), 1995

Benomite, Bemonite

A metallic ore covering the surface of an M-class planet in the Delta quadrant. Episode: *Once Upon a Time* (VOY), 1998

Benomite Crystal, Bemonite Crystal

A rare mineral used to create a quantum-slipstream. Because of its rarity, it is clearly not the same as benomite. Episode: *Timeless* (VOY), 1998

Beresium, Beresium Ore

Found on asteroids that impacted on the planet Terra Nova, it is toxic. Episode: *Terra Nova* (ENT), 2001

Bernicium

A valuable mineral found on the Saowin homeworld in the Delta quadrant. Episode: *Think Tank* (VOY), 1999

Berylite

A substance presumably called "berylite" is used in a piece of medical equipment called a Berylite Scanner. Episode: *A Matter of Time* (TNG), 1991

Bilitrium

A scarce lucent crystalline aggregate which can be transformed into a powerful explosive using an antimatter converter. Episode: *Past Prologue* (DS9), 1993

Bitrium, Bitrious Filaments

This biogenic material was left behind by the Crystalline Entity after it metabolized animate matter. *U.S.S. Enterprise* crew members detected small amounts of bitrium filaments in the soil of Melona IV. Episode: *Silicon Avatar* (TNG), 1991

Boronite, Boronite Ore

A rare mineral used to construct Vostigye space stations. It is the only raw material that can be used to create Omega molecules. Episodes: *The Omega Directive* (VOY), 1998, *Real Life* (VOY), 1997

Cartenum, Cortenum

The Talaxian, Mr. Neelix, believes that it can be found on a mineral-rich M-class planet in the Hemikek system, implying that it is a mineral. It can be combined with verterium and is found naturally. As it has also been described as monocrystal cortenum it can be deduced that it occurs in crystalline form of a significant size. Its use in warp coils implies that it is an important strategic mineral. Episode: *Investigations* (VOY), 1996 [Monocrystal Cortenum]

Cast Rodinium

Alternate name for roдинium. Episode: *Balance of Terror* (TOS), 1966

Chemicite

Alternate name for kemocite. Origin unknown. A highly explosive compound and dangerous to transport. Episode: *Little Green Men* (DS9), 1995 [Kemacite, Kemocite, Kemocyte]

Chondrite

This geologic aggregate was detected within the asteroid destroyed by the *U.S.S. Enterprise* NCC-1701 near Tessen III. Episode: *Cost of Living* (TNG), 1992.

Colgonite

An astringent used in restorative beautification therapy provided in the *U.S.S. Enterprise* NCC-1701-D's barber shop. Episode: *The Host* (TNG), 1991

Corbomite

Nonexistent substance (even in the Star Trek universe) referred to by Captain James T. Kirk in an attempt to bluff a hostile alien that the hull of his spacecraft contained an explosive material called corbomite. The ruse was that, if the ship was attacked it would release a destructive force that would destroy the attacker. This same ploy worked against the Romulans in the Romulan Neutral Zone when Kirk claimed to have a "Corbomite device" which would wreak havoc over a 200,000 kilometer radius if his ship was fired upon. Episodes: *The Corbomite Maneuver* (TOS), 1966, *The Deadly Years* (TOS), 1967

Cormaline, Cormalite, Cormoline

Naturally occurring valuable mineral. Torga IV in the Gamma quadrant is believed to have vast deposits of cormaline. Rich deposits of this compound are found on the Kazon-Ogla home world, the Ocampa planet. Also found on the second planet in the Kabrel system. Episodes: *The Ship* (DS9), 1996, *Statistical Probabilities* (DS9), 1997, *Caretaker* (VOY), 1995

Denivan Crystal

Valuable and illicit iridescent white crystals. They form sprays of sharply terminated elongate opaque crystals. Episode: *The Sound of Her Voice* (DS9), 1998

Deuridium

Naturally occurring deposits found in asteroid fields in the Gamma quadrant. The Kobliad need deuridium to stabilize their cell membranes in order to survive, implying that it is soluble and can be metabolized. Episode: *The Passenger* (DS9), 1993

Diburinium

A metallic substance of high density used by the Kelvin. Episode: *By Any Other Name* (TOS), 1968



Figure 4. Captain Kirk holds a sample of “dilithium” ore (actually a smoky quartz crystal used as a prop). Photo copyright 1966 by Paramount Pictures, all rights reserved.

Dilithium

Rare and incalculably valuable crystalline mineral used as the primary element in the matter/antimatter reactors necessary for warp speed travel. It is mined on the planets Rigel XII, Rura Penthe, Dozaria, Troyius, Vaska, Coridan and Drema IV, in the Reman mines on Remus (a planet in the Romulan system) and in the Halkon System. Dilithium was called “lithium crystal” on one of the very first episodes. Episodes: too many to mention.

Dilithium Hydroxyl

Fictitious mineral created through the exposure of dilithium to water and the vacuum of space. Episode: *The Catwalk* (ENT), 2002

Donacite, Donasite

Mineral found with limestone, which implies a sedimentary origin. (VOY)

Eisilium

Rare mineral found in a large quantity inside a comet encountered in 2151. Episode: *Breaking the Ice* (ENT), 2001

Falingian Diamond

Odo tries to recover the stones from an alien female just before suffering a medical emergency. The urgency of recovering them implies a great value. Episode: *Broken Link* (DS9), 1996

Feldomite

Precious mineral. In 2373, a discovery of a large feldomite deposit on Parsion III caused havoc on the Sepian Commodities Exchange, wiping out the bar owner Quark's investments. Episode: *Business as Usual* (DS9), 1997

Fistrium

Naturally occurring refractory metal found in caves of Melona IV, associated with kelbonite. Episode: *Silicon Avatar* (TNG), 1991

Fortanium

A mineral that occurs in the core of a comet. Episode: *Masks* (TNG), 1994

Galicite

Useful mineral found, among other places, on a Class-M colony planet of the Nezu in the Delta Quadrant. Episode: *Rise* (VOY), 1997

Gallicite

The *U.S.S. Voyager* detected a large lode of the extremely rare mineral on a planet inhabited by a people called the Sakari. Can be used to refit the ship's warp coils. Also found on Vulcan where in can give off an electrical charge. Episode: *Blood Fever* (VOY), 1997, *Kir'Shara* (ENT), 2004 [Gallicite]

Garnesite

A coal-like rock found on "Planet Hell" that can be used as a fuel for both heat and light. Episode: *Parturition* (VOY), 1995

Gold-pressed Latinum

Latinum is a metallic liquid which is encased in gold so that it be carried and exchanged easily. Episodes: *Past Prologue* (DS9), 1993, *Insurrection* (MPF), 1998 [Latinum]

Golside Ore

A mineral used by the Cardassians. Episode: *The Maquis, Part I* (DS9), 1994

Hytritium

Unstable mineral that is water-soluble and can neutralize tricyanate. Episode: *The Most Toys* (TNG), 1990

Ilium 629

Naturally occurring by-product of the geological decay of dilithium, traces of which were found on the planet Drema IV, leading to the discovery of unusual dilithium deposits in the planet's mantle. Episode: *Pen Pals* (TNG), 1989

Inertium Ore

Undescribed mineral substance traded by the Petarians. Episode: *Family Business* (DS9), 1995

Infernite

Origin unknown. When mixed with carbrodine, becomes explosive. Episode: *In the Hands of the Prophets* (DS9), 1993

Jakmanite

Usually undetectable by sensors, jakmanite has a half-life of 15 seconds, which implies that it is an unstable element. Episode: *Hollow Pursuits* (TNG), 1990

Jevonite

Naturally occurring, valuable gemstone found on Cardassia. Episode: *Chain of Command, Part II* (TNG), 1992

Kelbonite

Naturally occurring, refractory metal found in caves of Melona IV and Farlat III, associated with fistrium and in the caves on the Ba'ku planet. Episodes: *Silicon Avatar* (TNG), 1991, *Insurrection* (MPF), 1998

Kellinite

Metallic substance that could be used to reinforce the hull of Voyager's prototype all-environment shuttle craft. Episode: *Extreme Risk* (VOY), 1998

Kemacite, Kemocite, Kemocyte

Hazardous, unpredictable substance associated with temporal incidents, which if exploded, can send someone back in time. Alternate spelling of chemicite, although "kemocite" is the official spelling. Episodes: *Little Green Men* (DS9), 1995, *The Shipment* (ENT), 2003, *Proving Ground* (ENT), 2004, *Azati Prime* (ENT) 2004

Kibberian Fire Diamond

Luminous, crystalline, precious stones known to Ferengi. Episode: *Rules of Acquisition* (DS9), 1993

Koladan Diamond

Gemstone. Lobi crystals were facetiously referred to as being as bright as Koladan diamonds. Episode: *Caretaker* (VOY), 1995

Ladarium

Ore used by Cardassians to produce their warp drive mechanisms. Low-tech but profitable ladarium mining operations exist on Volon III. Episode: *Tribunal* (DS9), 1994

Latinum

Latinum is a rare grey metallic liquid known to the Ferengi. It is considered to be of great value. Episodes: *Past Prologue* (DS9), 1993, *Infinite Regress* (VOY), 1998, *Learning Curve* (VOY), 1995 [see: Gold-pressed Latinum]

Lithium Crystal

This mineral was required to fuel the early generations of warp drive engines, prior to the discovery of dilithium. Lithium crystals were laboriously processed at lithium cracking stations such as the one on Delta Vega. Lithium crystal was also used as a synonym for dilithium on one

of the very first episodes. Episodes: *Where No Man Has Gone Before* (TOS), 1966, *Mudd's Women* (TOS), 1966

Lobi Crystal

Supposedly valuable zircon-like gemstone with a high refractive index known to Ferengi. Episode: *Caretaker* (VOY), 1995

Magnacite, Magnasite

A highly acidic solution which can dissolve duranium found on Hanon IV. Episodes: *Necessary Evil* (DS9), 1993, *Faces* (VOY), 1995, *The Course of True Love* (VOY), 1997

Magnesite-Nitron

Produced in tablet form, this mixture can create heat and illumination when crushed. While magnesite is the name of a real mineral (magnesium carbonate) and nitron is a synonym for nitrogen or the trade name of a type of fertilizer, the qualities ascribed to this substance preclude it being a mixture of the two real substances. Episode: *Friday's Child* (TOS), 1967

Maraji Crystal

Crystals, made illegal by Cardassians, who do not like them. Bajorans cannot afford them, implying that they are a type of gemstone. Episode: *Things Past* (DS9), 1996

Merculite

Explosive material artificially generated by aliens and used in out-of-date rockets which are no match for Federation weaponry. Episodes: *Suddenly Human* (TNG), 1990, *Heart of Glory* (TNG), 1988

Mizinite, Mizainite Ore

Large deposits of this mineral can be found on Stakoron II in the Gamma quadrant. There is enough on Holna IV in the Kabrel system to keep Dominion shipyards running for years, implying that it is a metallic ore. Episodes: *Statistical Probabilities* (DS9), 1997, *The Nagus* (DS9), 1993

Monocrystal Cortenum

An alternate name for cortenum. Episode: *Investigations* (VOY), 1996 [Cartenum, Cortenum]

Murinite

A mineral used to make knife handles found on Argellius II, although another source says that it is found in the Argus River region on Rigel II. Episode: *Wolf in the Fold* (TOS), 1967

Neodilithium

Naturally occurring polymorph of dilithium. Used in the same way as dilithium but its crystal structure allows it to be more efficient when used in a warp drive, allowing higher velocities. Episode: *Threshold* (VOY), 1996

Neutronium

A naturally occurring, very dense and strong mineral composed of densely packed neutrons held together by gravity. Its use in the construction of ships hulls implies that it has metal-like properties. "Neutronium" is a legitimate term for compressed neutron matter found in the core of neutron stars, but it would be far too heavy to use in construction and would probably be highly unstable in small amounts. Episodes: *The Doomsday Machine* (TOS), 1967, *Relics* (TNG), 1992, *To the Death* (DS9), 1992

Nitrium

Naturally occurring metal used in an important alloy commonly found in starships. The alloy is used for computers, replicators, stabilizers, ventilators, power transfer conduits, dilithium chamber walls, and life support systems. Nitrium-rich asteroids existed in the Peloris Field. Nitrium is a synonym for the real mineral “Niter” but it is clear that this is not the same material. Episode: *The Cost of Living* (TNG), 1992

Noranium

A native metal used in the production of heat-resistant alloys. Episode: *The Vengeance Factor* (TNG), 1989

Paralithium

Crystalline substance which can be used as a fuel. It can be converted into trilithium. Episode: *The Chute* (VOY), 1996

Pergium

Naturally occurring mineral on Janus VI, New Sydney and on Hanon IV used to regenerate environmental control filters, which implies that it has absorptive qualities and could therefore be a clay mineral or a zeolite. Since it is found in rock consumed by the silicon-based life form, the Horta, it likely contains high amounts of silicon. Episodes: *Devil in the Dark* (TOS), 1967, *Fair Trade* (VOY), 1997, *The Course of True Love* (VOY), 1997, *Prodigal Daughter* (DS9), 1999

Polyferranide

A vital ore used as a warp coil sealant on starships to prevent nacelles from overheating. Polyferranide deposits tainted with astiline are useless. Episode: *Tattoo* (VOY), 1995

Polysilicate Verterium

Alternate name for verterium. One of two raw materials used to manufacture verterium cortenide, which is essential for warp drives. Polysilicate verterium is mined in the Alpha and the Delta quadrants. Episode: *Investigations* (VOY), 1996 [Verterium]

Promethean Quartz

Naturally occurring, valuable mineral that glows with an internal light implying that it is phosphorescent. Episode: *Q-Less* (DS9), 1993

Qallicite

Alternate spelling for Gallicite. Episode: *Blood Fever* (VOY), 1997

Rhodium Nitrite

A common ore which is combined with several other ingredients to manufacture cobalt diselenide. [note: Although rhodium is a real element and nitrite is a known radical, no such mineral is presently known to exist.] Episode: *For The Uniform* (DS9), 1997

Riddinite

Undescribed material the Albino used to construct his fortified residence on Secarus IV. Episode: *Blood Oath* (DS9), 1994

Rigelian Flame Gem

These illegal gemstones are mentioned by an agent of the Xindi to hide his true intentions. Otherwise they are undescribed. Episode: *Twilight* (ENT), 2003

Ritalin

A mineral having important medicinal uses. Alternate spelling for ryetalyn. Episode: *Requiem for Methuselah* (TOS), 1969

Rodinium, Roginium

Naturally occurring, hardest substance known to Federation science, used to protect Federation outposts along the Romulan neutral zone. However, even with an outpost buried miles underground, it provided insufficient defense against the Romulan energy weapon. Episode: *Balance of Terror* (TOS), 1966 [Cast Rodinium]

Rubindium Crystal

A red gemstone used in a subcutaneous transponder. While imprisoned on the planet Ekos, Spock used two crystals to make a primitive laser implying optical properties similar to ruby. Episode: *Patterns of Force* (TOS), 1968

Ryetalyn

Unusual, naturally occurring ore found on Holberg 917-G, which is the key ingredient in an antitoxin for Rigelian fever. The presence of the element irillium in ryetalyn compound nullifies its beneficial effects. Episode: *Requiem for Methuselah* (TOS), 1969 [Ritalin]

Salenite

Ore mined by quick-tempered ore extractors on Pentarus V. Episode: *Final Mission* (TNG), 1990

Separ Gemstone

This dense jewel traditionally features sharp facets. When Worf talked about the Lady Grilka he compared her eyes to separ gemstones. Episode: *Looking For Par'Mach in All the Wrong Places* (DS9), 1996

Silithium

This volatile, naturally occurring substance can be detected in some comets. Silithium and verteron particles produce an explosive reaction when they are put in close proximity to one another. A silithium-based comet threatened to destroy the verteron-laden Bajoran wormhole. Episode: *Destiny* (DS9), 1995

Sillinite Crystal

Ensign Samantha Wildman promised to bring home beautiful sillinite crystals from her away mission and collected these stones for her daughter. Episode: *Once Upon a Time* (VOY), 1998

Sonodanite

This material was used to construct Dirgo's shuttle craft, the *Nenebek*. Data believed that readings consisting of sonodanite, ermanium, and duranium indicated debris from the *Nenebek*. Episode: *Final Mission* (TNG), 1990

Spican Flame Gem

This worthless bauble is offered for sale by merchant Cyrano Jones in 2267. Episode: *The Trouble with Tribbles* (TOS), 1967

Styrolite

Artificially generated non-opaque particle used in packaging. Sterile, it can be used to package potentially biologically hazardous substances. Episode: *Unnatural Selection* (TNG), 1989

Talgonite

Artificially generated ceramic substance used in the construction of the Kataan probe. Episode: *The Inner Light* (TNG), 1992

Tekasite

A trilitium-tekasite-protomatter explosive device destroyed the *USS Yukon*. Episode: *By Inferno's Light* (DS9), 1997

Tellerium

A crystalline mineral used to stabilize harmonic reactions in a dilithium chamber. Episode: *Resistance* (VOY), 1995

Tetrahedral Quartz

An apparent polymorph of quartz, this mineral forms a 20-km-thick mantle of the planet Sikaris in the Delta quadrant. Episode: *Prime Factors* (VOY), 1995

Thalmerite

An explosive (thalmerite device) used in 2369 to destroy the Klingon bird-of-prey *Toh'Kaht*. Episode: *Dramatis Personae* (DS9), 1993

Topaline

A rare mineral found on Hanon IV and on Capella IV. Episodes: *Friday's Child* (TOS), 1967, *The Course of True Love* (VOY), 1997

Topoline Ore

A mineral found on a Xindi planet which can block scanning radiation. Episode: *The Shipment* (ENT), 2003

Trellium-A

As trellium-D is a mineral and trellium-A is described as being common, it can be deduced that it is perhaps a polymorph of trellium-D. Episode: *Rajiin* (ENT), 2003

Trellium, Trellium-D

A very rare, blue to blue-green mineral found on a planet and on asteroids in the Delphic Expanse and mined for its insulating qualities. It has a rough hackly fracture and is found in a powdery or massive form. It can be metabolized but is toxic to Vulcans. Episodes: *The Xindi* (ENT), 2003, *Rajiin* (ENT), 2003, *Anomaly* (ENT), 2003, *Impulse* (ENT), 2003, *Damage* (ENT), 2004, *The Forgotten* (ENT), 2004 [Trillium-D]

Trevium

A mineral that can react with trimagnesite to produce ultraviolet light. Episode: *Operation—Annihilate!* (TOS), 1967

Triadium

Associated with olivine and tryoxene, it was identified during a mineralogical scan of an asteroid artificially projected at the Nezu homeworld in the Delta quadrant. Episode: *Rise* (VOY), 1997

Tricyanate

A pink, highly toxic and unstable crystalline mineral resulting from the breakdown of dilithium. It may also be resinous. Difficult and expensive to synthesize, implying a mineral with a complex structure possibly containing rare elements. Episode: *The Most Toys* (TNG), 1990

Trilithium

Substance used multiple times as an explosive and used in the manufacture of a trilithium-tekasite-protomatter explosive device. Episodes: *Starship Mine* (TNG), 1993, *Generations* (MPF), 1994, *The Chute* (VOY), 1996, *By Inferno's Light* (DS9), 1997

Trillium-D

Alternate name for trellium-D.

Trillium, Trillium 323

Naturally occurring mineral substance used as a bargaining tool in the Chrysalian bid for the Bazaran Wormhole implying that it is a strategic mineral of some kind. Episodes: *Errand of Mercy* (TOS), 1967, *The Price* (TNG), 1989, *Trials and Tribble-ations* (DS9), 1996

Trimagnesite

Naturally occurring substance that reacts with trevium to produce ultraviolet radiation. Satellites containing trimagnesite and tritium were placed in orbit over the planet Deneva to destroy light-sensitive creatures that had taken over the bodies of the inhabitants. The ultraviolet radiation that they produced was found to be sufficient only after Spock was temporarily blinded by the full spectrum radiation that McCoy was testing. Episode: *Operation—Annihilate!* (TOS), 1967

Tritanium

A grey metallic mineral with a specular luster. Extremely hard substance used in construction of starship hulls 21.4 times as hard as diamond. La Forge and O'Brien determine that "something" caused the tritanium to crumble in their hands while they examined the wreckage of a shuttle, showing it is or can be made brittle. Found on Minos, a planet of former armaments dealers as a heap of scrap metal amidst thick foliage on the ground. Spock, who finds a large deposit of it on Argus X in the Argus system, phasers off a sample, since it is too hard to cut with normal tools. Episodes: *Obsession* (TOS), 1967, *Rascals* (TNG), 1992, *The Arsenal of Freedom* (TNG), 1988, *Repentance* (VOY), 2001

Tryoxene

Associated with olivine and triadium, it was identified during a mineralogical scan of an asteroid artificially projected at the Nezu homeworld in the Delta quadrant. Its name suggests that it might be similar to pyroxene. Episode: *Rise* (VOY), 1997

Uridium, Uridium Ore

Unstable mineral found on the planet Bajor that can become explosive if brought in contact with a strong electric charge. This implies it may be similar to gwihabaite (ammonium nitrate) and may be formed in a similar environment. However, the fact that the Cardassians use it to produce an alloy implies that the uridium is contained in the ore as a metallic constituent. Episodes: *Civil Defense* (DS9), 1994, *Indiscretion* (DS9), 1995

Vendarite, Venderite

Extremely valuable, naturally occurring mineral mined by the Ferengi. Episode: *Rascals* (TNG), 1992

Verterium

The Talaxian, Mr. Neelix, believes that it can be found on a mineral-rich M-class planet in the Hemikek system, implying that it is a mineral. It can be combined with cortenum. The fact that it is described as being a polysilicate implies that it is found naturally. Its use in warp coils implies that it is an important strategic mineral. Episode: *Investigations* (VOY), 1996 [Polysilicate Verterium]

Verterium Cortenide

The Talaxian, Mr. Neelix, believes that it can be found on a mineral-rich M-class planet in the Hemikek system, implying that it is a mineral and that its components verterium and cortenum are found naturally. Its use in warp coils implies that it is an important strategic mineral. Episode: *Investigations* (VOY), 1996

Vorilium, Vorillium

A mineral found on asteroids and on a planet in the Delta quadrant. Episodes: *Favorite Son* (VOY), 1997, *Darkling* (VOY), 1997

Xenite

Alternate spelling for Zienite. Episode: *Cloud Minders* (TOS), 1969

Zenite, Zienite

Naturally occurring mineral, found on the planet Ardana, from which a potent compound is derived by the Federation for use in stopping botanical plagues. Zenite in its natural state causes temporary mental impairment when its dust is breathed. Such an effect had profound social implications in separating the Troglite miners from the Stratus city dwellers. Episode: *Cloud Minders* (TOS), 1969 [Xenite]

2(5)6 Dilithium 2(:)1 Diallosilicate 1:9:1 Heptoferranide

Alternate name for Dilithium. This name, referred to in Krauss (1995), implies that dilithium also contains iron and silica. [See discussion of "Dilithium" on page 5]

Legitimate (non-fictional) Minerals

Aragonite *CaCO₃, orthorhombic*

Makes up part of the cave walls on the planet Terra Nova. Episode: *Terra Nova*(ENT) 2001

Archerite *(K,NH₄)H₂PO₄, tetragonal*

In order to bluff a Xindi commander, an Andorean Captain prevaricates that he is searching for "archerite" in the Delphic Expanse, which he considers a rare and valuable mineral. Playing on the name of Enterprise Captain Archer, he was unwittingly referring to a real rare mineral. Episode: *Proving Ground* (ENT), 2004

Barite *BaSO₄, orthorhombic*

Used by 20th century earth physicians to make intestines visible on X-ray images. Commonly called barium, it is a sulfate of that element. Episode: *Tuvix* (VOY), 1996

Beryl *Be₃Al₂Si₆O₁₈, hexagonal*

As part of an elaborate illusion, Captain Kirk is offered a bribe by an alien who is unaware that emerald (i.e. chromian beryl) is no longer considered valuable. The red variety is still considered valuable long after Captain Kirk's time. Episode: *Cat's Paw* (TOS), 1967, *Alice* (VOY), 1999

Beryllium, Beryllium Crystal $Be_3Al_2Si_6O_{18}$, hexagonal

A faceted, gemmy red stone is described as being very rare and of great value. As beryllium has been used as a miner's term for the metal's ore which is usually beryl, and the fact that a red cesian gem variety exists, one can deduce that this is the same stone. Gem-quality red beryl from Utah is very rare and of great value. Episode: *Alice* (VOY), 1999

Calcite $CaCO_3$, hexagonal

Limestone composed of calcite is found with donacite. It is also found in the caves on the Ba'ku planet. It was also mentioned in an episode of *Enterprise* during which geologists are rescued from the planet Xantoras. Episodes: *Insurrection* (MPF), 1998, (VOY), *The Breach* (ENT) 2003.

Coal C

A rock made up almost entirely of biogenic graphite. The Metrons forced captain James T. Kirk and the captain of a Gorn ship onto an asteroid with a rich geologic diversity. Captain Kirk used the coal he found as a source of carbon to make gunpowder for use in a primitive weapon. One of three Vulcans who crash-landed in the 1950's in Pennsylvania worked in a coal mine. Episodes: *Arena* (TOS), 1967, *Carbon Creek* (ENT) 2002

Cobalt Diselenide $CoSe_2$, cubic

Synthetic mineral. The Maquis combined rhodium nitrite with several other ingredients to manufacture cobalt diselenide, which can be either synthetic trogtalite or synthetic hastite. Since the latter is from the marcasite group and therefore less stable than the former, conjecture would hold that it was the former that was being synthesized. Episode: *For the Uniform* (DS9), 1997 [Trogtalite]

Corundum Al_2O_3 , hexagonal

The Metrons forced Captain James T. Kirk and the captain of a Gorn ship onto an asteroid with a rich geologic diversity. Captain Kirk mentions finding ruby corundum. As part of an elaborate illusion, Captain Kirk is offered a bribe by an alien who is unaware that sapphire (i.e. ferrian titanian corundum) is no longer considered valuable. Episodes: *Arena* (TOS), 1967, *Cat's Paw* (TOS), 1967

Diamond C, cubic

The Metrons forced Captain James T. Kirk and the captain of a Gorn ship onto an asteroid with a rich geologic diversity. Captain Kirk uses diamonds he finds to make a primitive weapon. Harcourt Mudd also makes mention of the high value of diamonds, indicating that it was still considered precious in the early episodes. Episodes: *Mudd's Women* (TOS), 1966, *Arena* (TOS), 1967

Emerald $Be_3Al_2Si_6O_{18}$, hexagonal

As part of an elaborate illusion, Captain Kirk is offered a bribe by an alien who is unaware that emerald (i.e. chromian beryl) is no longer considered valuable. Episode: *Cat's Paw* (TOS), 1967

Ferric Oxide Fe_2O_3 , trigonal or cubic

Detected [as rust] on an old truck floating in space in the Delta quadrant, ferric oxide occurs in nature as hematite or maghemite. The trigonal form, hematite, is by far more common and has been detected on other planets. It is the likely polymorph found by the crew of *U.S.S. Voyager*. Episode: *The 37's* (VOY), 1995

Granite

A rock composed of a mixture of quartz, mica and potassium feldspar. It is found on the Garan mining colony in the Delta quadrant, together with pyroclastic rock types. Episode: *Macrocosm* (VOY), 1996

Gold *Au, cubic*

This yellow, corrosion-resistant precious metal once served as Earth's global monetary standard, and was used in jewelry, decoration, and electrical components. Used by Ferengi (who do not consider it particularly valuable) to encase latinum (see "gold-pressed latinum"). The powdered form (gold dust) is sold to primitive cultures where it is considered valuable. Harcourt Mudd also makes mention of the high value of gold, indicating that it was still considered precious in the early episodes. Episodes: *Mudd's Women* (TOS), 1966, *Little Green Men* (DS9), 1995, *Who Mourns for Morn?* (DS9), 1998, *Dark Frontier, Part I* (VOY), 1999

Halite *NaCl, cubic*

Commonly known as rock salt, it is an essential mineral for most living beings. A hypnotic alien creature, the last surviving member of her species, who killed for it, was encountered by the crew of the *Enterprise*. Episode: *The Man Trap* (TOS), 1966 [Salt]

Hematite *Fe₂O₃, trigonal*

Detected on an old truck floating in space in the Delta quadrant. Hematite is very common and has been detected on other planets. Episode: *The 37's* (VOY), 1995 [Ferric Oxide]

Ice *H₂O, hexagonal*

Common mineral stable as a solid only below 0E C, above which it turns to water. Appears in numerous scenes throughout the various series, especially on Sarpeidon during its ice age. Episodes: *All Our Yesterdays* (TOS), 1969, *Timeless* (VOY), 1998

Iridium *Ir, cubic*

Naturally occurring heavy metallic element of the platinum group. Ions of iridium in a Nechani subterranean shrine can cause a dielectric effect and can protect individuals from lethal doses of biogenic energy. Episode: *Sacred Ground* (VOY), 1996

Limestone

A rock usually composed of the mineral calcite, found with donacite. (VOY)

Magnesite *MgCO₃, hexagonal*

This magnesium analog of calcite is used by the Kazon and the Federation to fabricate starships. Also extracted from a Pakled mine on Kalla III. Magnesite is also the preferred fuel for outdoor cooking, and in a magnesite-nitron disk configuration is used as a portable light source. Drilling phasers applied to raw magnesite ore can cause dangerous harmonic feedback waves, and transporter beams cannot penetrate rocks containing the substance. Episodes: *Inheritance* (TNG), 1993, *Nor the Battle to the Strong* (DS9), 1996, *Initiations* (VOY), 1995, *Tattoo* (VOY), 1995, *Firstborn* (TNG),

Niter *KNO₃, orthorhombic*

Proper mineral name for saltpeter. Captain Kirk used the niter he found to make gunpowder for use in a primitive weapon. Episode: *Arena* (TOS), 1967 [Saltpeter]

Olivine, Olivene *(Fe,Mg)SiO₄, orthorhombic*

Common name given to minerals of the fayalite-forsterite series. It was identified during a mineralogical scan of an asteroid artificially projected at the Nezu homeworld in the Delta quadrant. Episode: *Rise* (VOY), 1997

Osmium *Os, hexagonal*

Member of the platinum group of metals. It is used by the Kalendans to produce diburnium-osmium alloy which is highly resistant to energy bursts and radiation. Episode: *That Which Survives* (TOS), 1969

Platinum *Pt, cubic*

The leader of a trellium-D mine in the Delphic Expanse demands platinum from the Enterprise in exchange for access to a Xindi miner. Episode: *The Xindi* (ENT), 2003.

Quartz *SiO₂, hexagonal*

Quartz is mentioned when one of three Vulcans, who crash-landed in the 1950's in Pennsylvania and worked in a coal mine, breaks through a wall of quartz in the mine. Episode: *Carbon Creek* (ENT) 2002

Ruby *Al₂O₃, hexagonal*

The Metrons forced captain James T. Kirk and the captain of a Gorn ship onto an asteroid with a rich geologic diversity, where he mentions finding rubies (i.e. chromian corundum). Episode: *Arena* (TOS), 1967

Salt *NaCl, cubic*

Common name for halite. It is an essential mineral for most living beings, including an alien creature, encountered by the crew of the enterprise, who killed for it. Episode: *The Man Trap* (TOS), 1966

Saltpeter *KNO₃, orthorhombic*

The Metrons forced captain James T. Kirk and the captain of a Gorn ship onto an asteroid with a rich geologic diversity. Captain Kirk uses saltpeter he finds to make gunpowder for use in a primitive weapon. Episode: *Arena* (TOS), 1967 [Niter]

Sapphire *Al₂O₃, hexagonal*

As part of an elaborate illusion, Captain Kirk is offered a bribe by an alien who is unaware that sapphire (i.e. ferrian titanian corundum) is no longer considered valuable. Episode: *Cat's Paw* (TOS), 1967

Selenium *Se, hexagonal*

This chemical element can appear in several forms. The Lambda Paz sentry used a type of vitreous selenium to cocoon anyone who tried to disturb its source of water. In 2373, the Maquis stole selenium to make synthetic trogtalite (cobalt diselenide), a deadly biogenic agent. Episodes: *Final Mission* (TNG), 1990, *For The Uniform* (DS9), 1997

Silicon *Si, cubic*

Spheres found by pergium miners on Janus VI, turn out to be biogenic silicon eggs of a silicon-based life form called the Horta. *Devil in the Dark* (TOS), 1967

Sulfur *S, orthorhombic or monoclinic*

The Metrons forced captain James T. Kirk and the captain of a Gorn ship onto an asteroid with a rich geologic diversity. Captain Kirk uses sulfur he finds to make gunpowder for use in a primitive weapon. Episode: *Arena* (TOS), 1967

Transparent Aluminum *"-Al₂O₃, hexagonal*

Transparent aluminum was mentioned by First Engineer Montgomery Scott as a clear, tough material made from aluminum which would exist in earth's future. An oxide variant was

subsequently developed by a German ceramic lab—Institut für Keramische Technologien und Sinterwerkstoffen (Fraunhofer)—in 2002. It consists of sintered alumina creating a synthetic corundum and is named “transparent alumina.” Episode: *Star Trek IV: the Voyage Home* (MPF), 1986



Figure 5. Biogenic silicon (eggs of the horta). Photo copyright 1967 by Paramount Pictures, all rights reserved.

Trogtalite *CoSe₂, cubic*

The Maquis combined rhodium nitrite with several other ingredients to manufacture cobalt diselenide which can be either synthetic trogtalite or synthetic hastite. Since the latter is from the marcasite group of minerals, and therefore less stable than the former, conjecture would hold that it was the former that was being synthesized. Episode: *For The Uniform* (DS9), 1997 [Cobalt Diselenide]

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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 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, Montreal, Quebec. In 1996 he was awarded the Meritorious Service Medal by Queen Elizabeth II.

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APPENDIX I. Sample hypothetical abstract for “dilithium.”

It should be noted that this “abstract” is presented to give an idea of what it might look like if the mineral dilithium really existed. It is, therefore, a combination of information from various sources. Dilithium is not a real mineral, and some of the information contained here would be mineralogically impossible, although some of the physical properties would be completely feasible. The most unlikely properties are the unique optical properties that make it such a unique material in the Star Trek universe.

[See next page.]

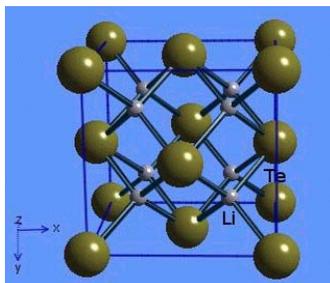


Figure 6. Crystal structure of “dilithium” (dilithium telluride). Courtesy: Dr. Mark J. Winter, University of Sheffield, UK”

DILITHIUM Li_2Te

Crystallography

Cubic, pseudo-orthorhombic, space group $m\bar{3}m$.

Unit cell data: a 6.504 Å, b 14.55 Å, V 275.13 Å³, Z 12.

Class 222, $a:b:c$ = 0.5271:1:0.5271.

Morphology: Occurs as well-formed to coarse crystals up to fist size. Similar in appearance to quartz. Tabular form thin in one direction along [010].

Twinning: none observed.

Crystal structure: Four coordinate tetrahedral prototypical antiferrofluorite structure.

X-ray powder diffraction data: 3.7400 (80) (111), 3.2517 (50) (200), 2.2993 (80) (220), 1.9609 (100) (311), 1.4920 (50) (331), 1.4542 (50) (420), 1.3275 (50) (422), 1.2516 (50) (333), 1.0993 (50) (531), 0.9107 (50) (711), 0.8696 (50) (642), 0.8472 (75) (553)

General Appearance

Oblong crystals from a few centimeters to approximately 30 centimeters usually free from other minerals. May be partially altered to ilium 629.

Physical Properties

Luster adamantine to resinous; transparent to translucent; white, pale pink, amber brown or bottle brown with a white streak. Triboluminescent. Hardness 5; very brittle, Cleavage [001] distinct; fracture conchoidal.

Density: 3.240 g/cm³ (meas.), 3.42 g/cm³ (calc.).

Optical Properties

Uniaxial (+); ω = 1.952-1.984, ϵ = 1.971-2.010.

Chemical Analytical Data

The ideal formula requires: Li 9.81 %, Te 90.19 % Total 100.00 wt.%.

Localities

Rigel XII, Rigel system. Drema IV. Coridan. Rura Pente, Klingon Empire. Troyius. Vaska. Interplanetary asteroids, Halkon system. Dozaria system. Reman mines on Remus, a planet in the Romulan system.

Occurrence

Silica-poor planetesimals which did not undergo significant parent-body metamorphism during formation.

Relationship to Other Species

Polymorph with neodilithium.

Name

Named after its composition.

Comments

Not IMA Approved. Also referred to as 2(5)6 Dilithium 2(:)1 Diallosilicate 1:9:1 Heptoferranide (of Krauss, 1995), Lithium (I) Telluride, Lithium crystal (part). Only known substance other than neodilithium that allows anti-hydrogen to pass through its structure without coming in contact with it.

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