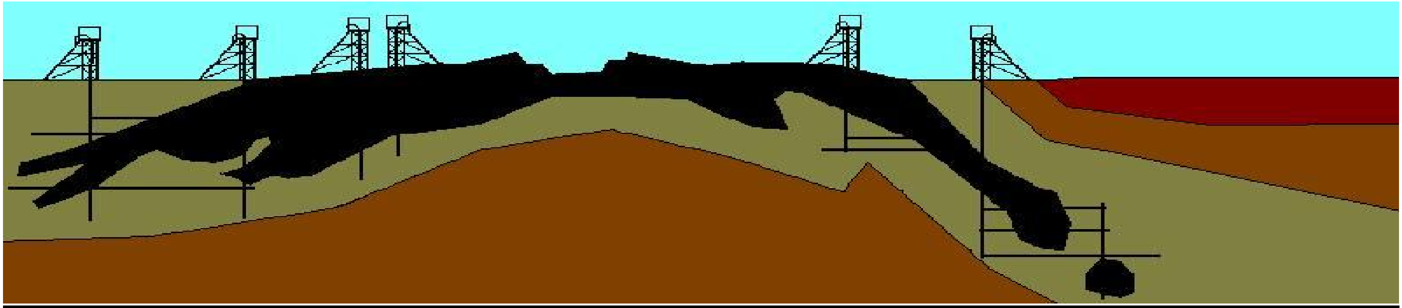
The line from the lode



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The Newsletter of The Broken Hill Mineral Club Inc.

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SUBSCRIPTIONS

Annual Membership to the Broken Hill Mineral Club Inc. is as follows

Full Membership - $20
Associate Membership - $15
Family Membership - $35
Child Under 16 - $5
Newsletter Subscription - $5

For Community Inc. Membership add an extra $3.50 per person

CLUBROOM SOON TO BE READY

At the last meeting it was announced that the council had finally approved the shed at Community Inc and now we have started to line it out, power it up and set-up the internal fixtures. This means that we should have it operational by the end of the year and using it as our workshop. The plan is to still hold our monthly meetings in the Community Inc building while we get everything set up in the workshop, then move across once we are happy with how many people can fit in at once. If there are a large number of people at the meeting we can always move back into the main building.

We will need some people soon for a working bee to paint the room out and build in the workbenches. This will be co-ordinated by Terry Weber and Trevor Dart and volunteers can notify either Terry or Trevor of their availability.

Once we are done the final plan is to start up regular cutting and polishing (as well as faceting) workshops and train up some instructors to run these for the future.

We will also have the room open during the Community Inc. market days and allow members to sell material while we have cutting and polishing demonstrations.

So...it wont be long and we're. back in a clubroom and with working machinery to use.

Until next time…

happy fossicking… Trev

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BROKEN HILL MINERAL CLUB

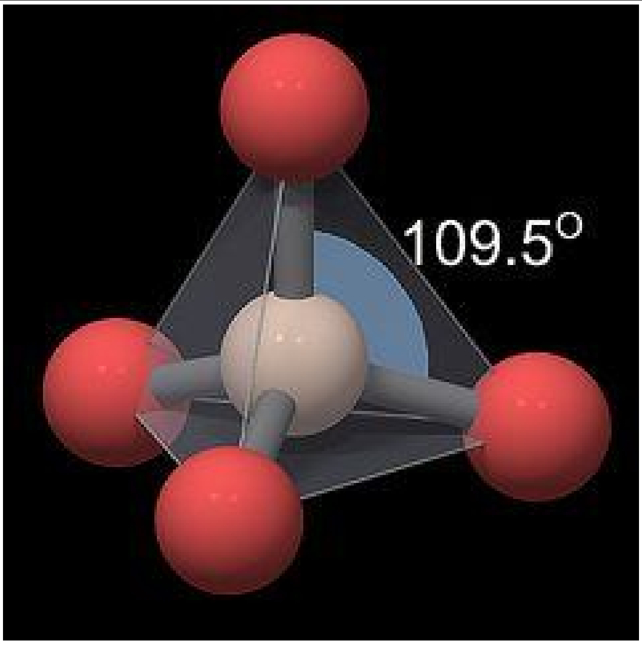
The silicates - A guide to the silicate family of rock forming minerals

The Silicates form the largest identified group of minerals and are the main constituents of igneous rocks. These minerals can either form from the crystallisation of molten material or via changes in crystallisation during metamorphism.

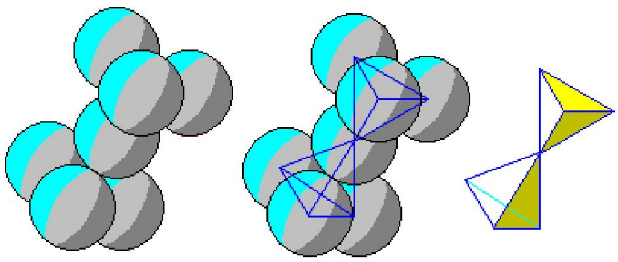
Via igneous processes the minerals likely to form during crystallisation are determined by the initial temperature of the parent magma. This temperature starts at around 1200 degrees Celsius and all minerals crystallise by 600 degrees Celsius. The high temperature minerals form the igneous rock basalt while the lower temperature minerals form granite. While these are the two extremes of the scale, there is a continuous series from high to low and this determines not only the mineral assemblages but also the corresponding igneous rock formed.

Other contributing factors with crystallisation are the time taken to cool and solidify and the amount of fluid medium available. Longer cooling times mean larger crystals - such as found in gabbros and granites, while higher fluid content results in very large crystals - such as those found in pegmatites.

The Silicate minerals are all based on a tetrahedral structure of one central silicon atom surrounded by four oxygen atoms. This silica tetrahedron forms the basic unit or building block from which all the silicates are made. They are divided into sub-classes starting with individual tetrahedrons and ending with complex three dimensional network structures containing millions of tetrahedrons joined to each other.



Above: The structure of the silicon tetrahedron.
Below: Double tetrahedral hourglass structure as found in sorosilicates.



THE SIMPLEST SILICATES

Are all based on single tetrahedrons of SiO_4 held together by metal cations such as zirconium, magnesium, calcium, aluminium and iron. They form first at the highest temperatures and are the main minerals found in rocks such as basalt. These minerals are called the *NESOSILICATES* and the best examples include zircon, the garnet group and the olivine group of minerals.

COMING TOGETHER

The next stage is the joining of these tetrahedrons into simple pairs by the sharing of one oxygen atom.
This sub-group is called the *SOROSILICATES* and includes minerals such as epidote, vesuvianite and hemimorphite. With the exception of epidote, most of the sorosilicate minerals are quite rare in comparison to the other silicate sub-classes and this could perhaps be due to their unusual hourglass structure.

BECOMING MORE COMPLEX

The next stage in the series is when the tetrahedrons start to join up and become more complex structures. They have two possible structural directions that they can go and this may be defined by differences in pressure. The two directions are to form ring structures or to form chains. The ring structures are most common in pegmatitic and high fluid magmas while the chain structures are most common in directed pressure metamorphic terrains and altered skarns.

RING STRUCTURES

There are different cyclic styles including triangular, square and hexagonal. This sub-group is named the *CYCLOSILICATES* and include minerals such as benitoite, axinite, tourmaline and beryl. With the exception of the tourmalines the rest of the group are most commonly found in igneous rocks - particularly in pegma-

The silicates - A guide to the silicate family of rock forming minerals- continued

tite veins where the fluids allow for spectacular growth and combinations.

CHAIN STRUCTURES

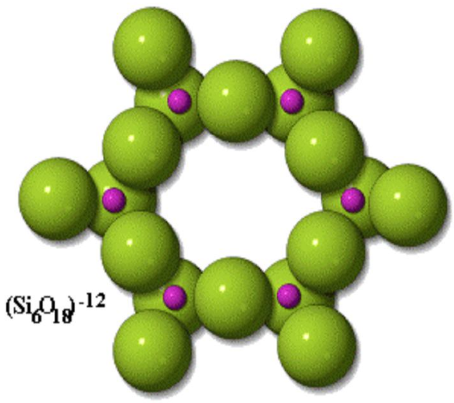
The tetrahedrons all link up into long chains and then these combine laterally to form double chains. This subclass is called the *INOSILICATES* and includes pyroxene minerals such as augite, and the amphibole minerals such as riebeckite (asbestos) tremolite, and actinolite. These minerals have distinctive bladed and fibrous forms and are typical of intermediate igneous rocks and metamorphosed basalts - amphibolites. The single chained pyroxenes tend to form blocky crystals while the double chained amphiboles form the long fibres.

SHEET STRUCTURES

The chains now link up along the perpendicular plane to form sheet structures. These sheet structures have the distinctive cleavage along the sheet and peel off as thin layers. This sub-class is called the *PHYLLOSILICATES* and includes the micas, clay minerals and the serpentines. These minerals are most common in granitic rocks and pegmatite and can make up to 90 percent of higher grade metamorphic rocks.

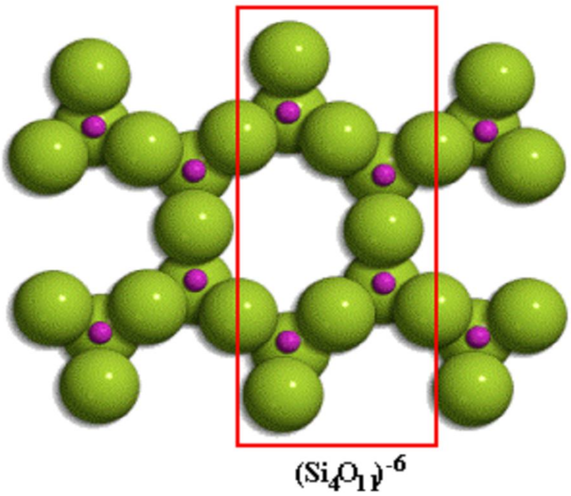
FORMING 3D STRUCTURES

The tetrahedron sheets combine to form large complex 3 dimensional structures. This sub-class is named the *TECTOSILICATES* and includes the most common rock forming minerals - quartz and the feldspar group of minerals. These two minerals are the major constituent minerals in granites and gneisses, two rocks that together make up over 80 percent of the Earth's continental crust. The other major tectosilicates are the zeolite minerals. These regularly form linings in cavities in basalts after the original rock has cooled and circulating fluids fill these voids.

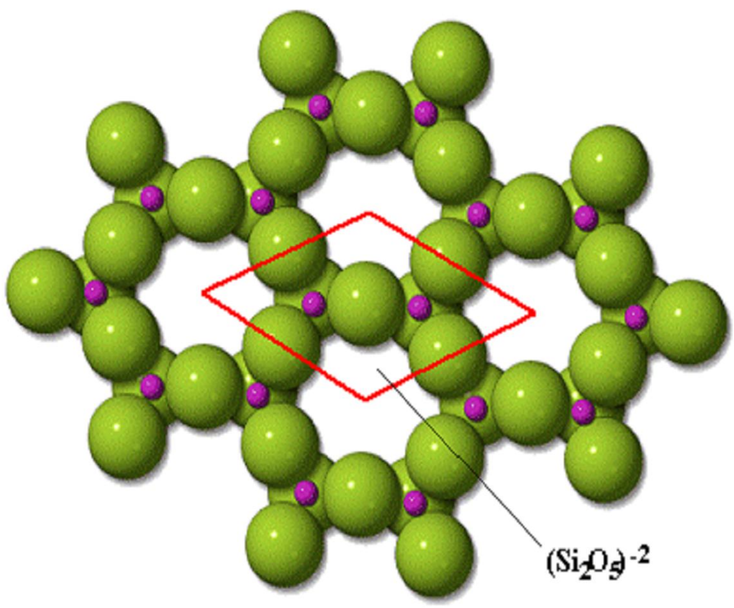


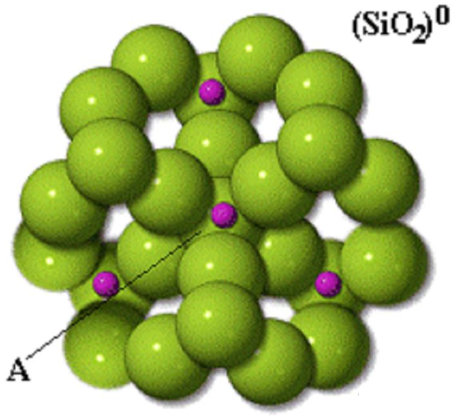
Left: Ring tetrahedron structures

Right: Double chain tetrahedron structures



Below: Sheet tetrahedron structures





Above: 3D complex tetrahedron structures

The silicates - A guide to the silicate family of rock forming minerals- continued

Representative Examples of Silicate Minerals

Top Left: Olivine from Mortlake, Victoria
Top Centre: Hemimorphite from Mexico
Top Right: Epidote from Alaska, USA
Centre Left: Beryl (variety Aquamarine) on Muscovite Mica from Pakistan
Centre: Benitoite (blue) with Neptunite (black) from California, USA
Above: Spessartite Garnet on Quartz from China
Far Left: Actinolite from the Flinders Ranges, South Australia
Left: Elbaite (tourmaline) from Pakistan
Bottom Left: Muscovite Mica from Brazil
Bottom Centre: Orthoclase felspar from Oberon, NSW
Bottom Right: Quartz from Eyre Peninsula, South Australia

Field Trip Reports - PURNAMOOTA and PLUMBAGO

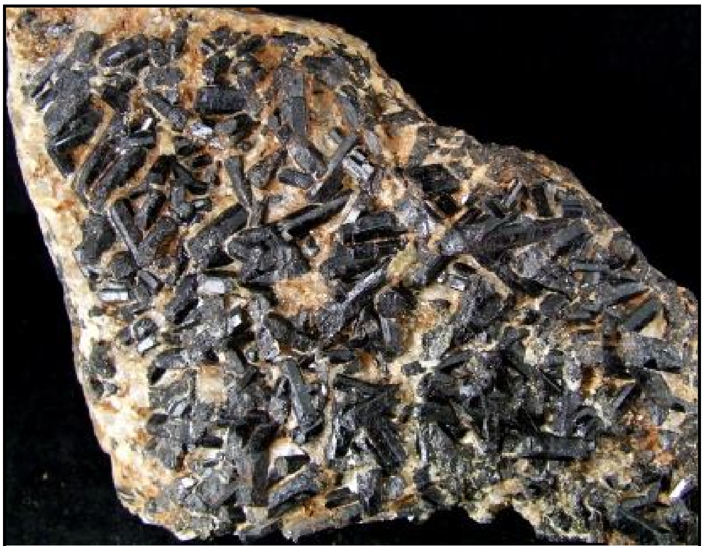
The last two field trips have been in August, to the Black Prince area on Purnamoota Station and in September, to Plumbago Station as a weekend trip.

Both were quite successful in the collecting of quality material with all that attended coming home with nice specimens.

PURNAMOOTA STATION

On Purnamoota we visited the reef of schorl tourmaline approximately one kilometre north of the Black Prince. Here we uncovered some very nice plates of quartz with scatterings of sharp and clean - doubly terminated tourmalines over the surfaces. After we had found suitable pieces we ventured back to the Black Prince and had lunch and a bit of a fossick for copper minerals on the dumps.

All in all a good day and a great chance to get out and bash some rocks.



Tourmaline on quartz from the reef - one kilometre north of the Black Prince Mine on Purnamoota Station.

PLUMBAGO STATION

The weekend trip to Plumbago Station was a joint field trip with the Port Pirie club and the Mineralogical Society of South Australia.

As field officer, Trevor ventured down a few days earlier and together with David Tiller, Ashleigh Watt and John Chivers did some exploratory work to try and find some new locations and reassess some of the previously visited sites. This early arrival paid off as after a fair amount of walking we located the Mount Victoria copper mine and found good quality magnetites up to 6-10 mm in size. Also at this location we found copper minerals such as azurite and malachite, chalcopyrite, pyrite, xenotime, apatite, epidote and limonite pseudomorphs after pyrite - devil's dice.

After three days of exploratory work to assess old locations and seek out new ones, the full group was able to visit several sites over the Friday, Saturday and Sunday.

Old favourites included sites such as the Ethiudna Copper Mines where nice chrysocolla and olivenite could be found. The Lookout Hill mine and Stremples shaft where andradite garnet, grossular garnet, vesuvianite, conichalcite and clinoclase could be collected. At Stremples Shaft, a find of a new mineral for this location in olivenite was made by Lyndon Penney of the Yorke Peninsular club.

The Billeroo davidite prospect was revisited and shown to still provide good crystals of this mineral. The method now seems to be to scratch around through the surface material as most of the evident crystals have now been picked up. By scraping through the top 4 - 8 inches of soil many of the party were able to acquire that one great piece. This would be the case for Ashleigh Watt, who after three visits to this site has finally gone home with a prize sample.

The new locations included the Mount Victoria Copper Mine, some pegmatites on the northern flank of Mount Victoria containing yttrocolumbite, samarskite monazite and xenotime and andradite garnet and epidote horizons with good crystals near Lookout Hill.

This trip was well worth the travelling and camping out as so much good material was obtained over the time spent.

Plumbago - and in particularly the Mount Victoria region is worth going back for another trip, as there is more still to be found with a little exploratory walking.

Magnetite from the Mount Victoria Copper Mine

PLUMBAGO Field Trip

Clockwise from top left:

The Mount Victoria Copper Mine.
Fossicking for copper minerals at the Mount Victoria Copper Mine.
Aboriginal water (gnamma) hole in an outcrop of granite near the Mount Victoria Copper Mine.
Old hut ruin at the Mount Victoria Copper Mine.
Ashleigh Watt's "finally got a good one" davidite.
Fossicking at the Lookout Hill Mine: Andradite garnets from the Lookout Hill Mine.
Group photo taken at Stremples Shaft on Lookout Hill.
Fossicking for davidites at the Billeroo Davidite Deposit.