Got a pocket full of Sunstone? Maybe think twice

Sunstone falls part of the Feldspar mineral group. It is known for exhibiting what is called “Aventurescence”.

Natural Orthoclase Sunstone

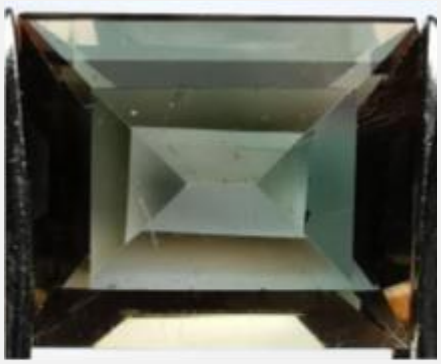
Aventurescence is a type of iridescence (a play-of-colour) that is caused by the reflection of small, thin and platy inclusions - copper, goethite and/or hematite in the case of Sunstone - that are spread in a parallel orientation through the gem.

This causes interference of light between the layers of platelets which creates the glittery sheen associated with Sunstone (see image on the above right).

The larger and more abundant the inclusions are, the more “Aventurescent” the stone will be and the deeper the golden colour will appear.

Photomicrograph of the copper inclusions in the Oregon Sunstone.

There are also transparent Sunstones from Oregon in the USA. They are often green and/or red in colour, with small copper inclusions (often in “streams”) creating a “Schiller” effect.



Oregon Sunstone (notice the small copper inclusions at the top right of the gem) - this falls under the ‘Labradorite’ species.

Kaylan Khourie, FGA

Sunstone falls into three species

Sunstone can fall into three species of the Feldspar group: Orthoclase, Oligoclase and Labradorite (this is also into where the Oregon material falls). Orthoclase falls under the “Alkali Feldspar” category whereas Oligoclase and Labradorite fall under the “Plagioclase Feldspar” category. Below is a table of each species of Sunstone and some of their properties:

Species	Chemical Composition	Specific Gravity	Refractive Index	Birefringence
Orthoclase	$KAlSi_3O_8$	2.58	1.518 - 1.526	0.005 -0.008
Oligoclase	Solid solution between $NaAlSi_3O_8$ and $CaAlSi_2O_8$	2.65	1.539 - 1.547	0.007 - 0.010
Labradorite	Solid solution between $NaAlSi_3O_8$ and $CaAlSi_2O_8$	2.70	1.559 - 1.568	0.007 - 0.010
↳ *Oregon material*	Solid solution between $NaAlSi_3O_8$ and $CaAlSi_2O_8$	2.67 - 2.72	1.563 - 1.572	0.009

However, the gems being marketed as “Sunstone” are almost always pieces of man-made glass containing an abundance of tiny copper inclusions.

Pieces of uncut and tumbled Goldstone

The correct name for this is “Aventurine Glass” - however the misnomer “Goldstone” is more popular for marketing purposes. Ironic, given that it is coloured by copper, not gold.

Kaylan Khourie, FGA

Goldstone as an imitation of Sunstone

Imitation gems are usually manufactured to have properties (physical and optical) that are close to the gem that they are imitating - either to create an appearance as close to the imitated gem as possible or as an attempt to make its real identity difficult for the gemmologist to discover.

This is why Goldstone has a refractive index and/or specific gravity that overlap with the different Sunstone species:

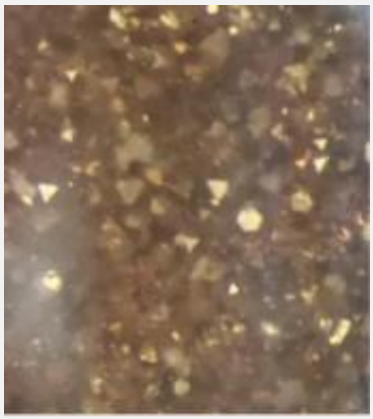
Identification	Chemical Composition	Specific Gravity	Refractive Index	Birefringence
Goldstone	SiO_2	2.50 - 2.80	1.530 to 1.550	0.000

The defining factor is that glass is amorphous and therefore singly refractive whereas Feldspar is either Monoclinic (Labradorite and Oligoclase) or Triclinic (Orthoclase) and this causes the stones to be doubly refractive.

Due to the amorphous nature of glass, it has a low thermal conductivity and is therefore warm to the touch, whereas crystalline gems have a higher thermal conductivity and will be colder to the touch.

This can be tested by simply placing the gem on your face (which is sensitive to temperature) for observation.

The visual appearance (colour, etc.) and microscopic observations are also very useful in identifying Goldstone:



Triangular and hexagonal copper platelets in Goldstone

Goldstone is coloured by an abundance of tiny triangular and hexagonal platelets of copper (see image above).

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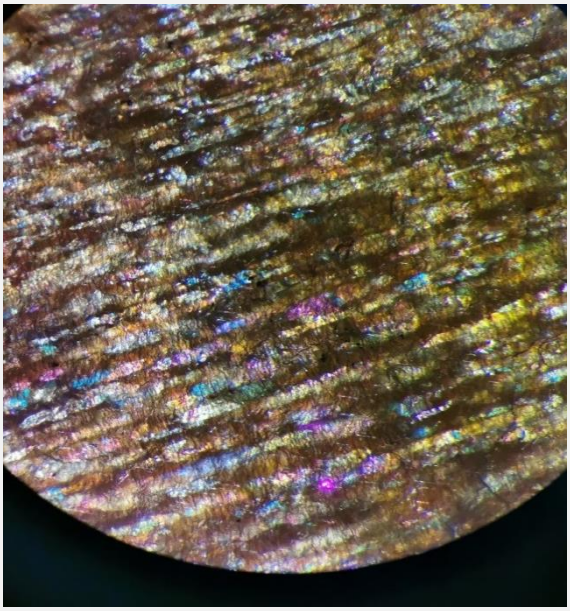
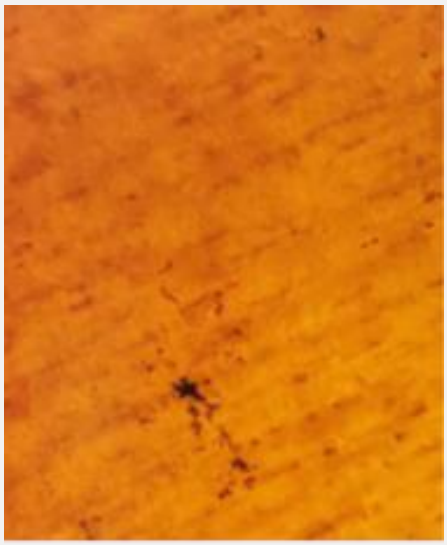
Copper platelets in Sunstone

Similarly, Sunstone is typically included with copper platelets - however they additionally contain long hematite and/or goethite platelets. As mentioned above, this is the reason for the Aventurescence.



This is a photomicrograph (to the left) of the platelets in the Orthoclase Sunstone on page 1.

Although uncommon, dendritic manganese staining can also be observed in some specimens
(To the right is also a photomicrograph of the Orthoclase Sunstone on page 1).



Dendritic Manganese staining in Orthoclase Sunstone

This is a specimen of native copper (to the left). It is the main inclusion creating the “Schiller” effect in Goldstone and Sunstone (as well as hematite and/or goethite).

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Full disclosure should always be given!

Imitations of natural gems will always be readily available because it enables the consumer to buy something that looks similar to its natural counterpart. This is not a problem since the simulant, for the most part, has a very similar appearance to the natural gem - and it comes at a fraction of the cost.

So be weary when being offered a desirable, and usually expensive gem, at a relatively "cut-price" deal.

What's important about this is that full disclosure as to what the gem is should be given so that the price for the gem is reasonable in the market - one should never buy a cubic zirconia under the impression that is a diamond, at a diamond's price.

It is always wise to insist on a gemmological certificate of some kind from a reliable laboratory when purchasing a gemstone of significant value.

This industry can be somewhat untrustworthy at times, so being sure of a gemstone's true identity will certainly save you a lot of money.

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