

# OPAL

*What is it? How is it formed? Why and how is it coloured? What types of opal are there? What is its value?*

**WHAT IS IT?** Opal is a true precious stone which occurs in many varied forms. Opal is amorphous silica with a water content varying from one to twenty percent, depending on the porosity and degree of hydration. Precious opal usually contains from six to ten percent water. Opal which is dull and valueless is called common opal. Common opal occurs in abundance throughout the world. About 95% of all opal mined from the opal fields is common or potch, that is opal that is basically one coloured, i.e. white, grey, black, and is only suitable for backings for doublets or triplets. Of the 5% that has some colour about 95% is only of mediocre grade and therefore it can be seen that only approximately 1/4 of 1 percent has any real value at all. Top quality or precious opal is solid opal. Top grade doublets or triplets are noble opal, not precious because their opal content is only a very thin veneer. The chemical properties of opal are silicon dioxide and water with a formula of  $\text{SiO}_2 \cdot \text{H}_2\text{O}$ . It has a hardness of 5.5 to 6.5 on Moh's scale of hardness, which puts it about half way down the range. It has a specific gravity of 1.9 to 2.3 depending on the amount of water present. Opal is chemically inert but will blemish slightly if heated with Sulphuric Acid.

**HOW IS IT FORMED?** Opal is formed from a solution of silicon dioxide and water. The solution flowed into cracks and voids in sedimentary as well as volcanic areas of the inland country. This solution had a rate of deposition of approximately one centimetre thickness in five million years at a depth of forty metres. Over a period of approximately 1 to 2 million years after this period solidification occurred as the climate changed. The opal therefore remained soft and un-cemented for long periods before becoming hardened.

**WHY AND HOW IS IT COLOURED?** As the silica in solution was deposited and the water content gradually decreased spheres formed in the gel. The spheres are formed by the particles silica spontaneously adhering to other particles which form around it. These spheres of amorphous silica range in size from 1500 to 3500 angstroms (1 angstrom is 1 ten millionth of 1 millimetre). These are not only remarkably uniform in size but are packed, in gem quality opal, in a very regular array. Because they are spherical there are tiny holes remaining in the structure (much the same as when marbles are placed together in a container) and these holes too are arranged in a regular three-dimensional way. Therefore because of the regular array of these cavities opal is an optical diffraction grating for visible light. The bigger the spheres, of about 3500 angstroms diameter, the lower down the spectral range colours occur especially red. And at the other end of the scale at about 1500 angstroms diameter the blue end of the spectrum is diffracted. Between these figures the rest of the colours of the rainbow occur. From this can be deduced that the light diffraction in the voids is greatest when the sphere size is greatest. Therefore red is usually the brightest and the blue duller.

**WHAT TYPES OF OPAL ARE THERE?** Black Opal - now scarce and very expensive. Crystal Opal – Jelly Opal – Milky or White Opal – Matrix Opal – Boulder Opal – Volcanic Opal – Yowah Nut. The basic patterns in Opal are listed under the main headings of Pinfire – Harlequin – Flame – Flash – Regular pattern, all these have various subheadings.

**WHAT IS ITS VALUE?** The main determining factors are quality, colouring and size. QUALITY comprises the following features; Clarity of colour, intensity of colour, distinct pattern of colour, overall body colour and the absence of any flaws such as cracks, sand or potch. COLOURING - The fire or opalescence in precious opal always seems to appear from a solid background colour. Red is usually the most sought after and expensive colour in opal. Combinations of most or all of these features constitute a stone of high quality. Personal taste however will determine ultimately your individual choice.