
Colour, composition, and rheology of obsidian

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Abstract

Obsidian is the most spectacular natural lava and probably the oldest glass used by mankind for almost 10,000 years. After MORB, they are the most important natural glass on Earth in terms of quantity, and their formation is still the subject of much debate. As a glass, it is characterised by high silica (> 68%wt), alumina (> 10%wt), ferrous and ferric oxide content (1-5%wt) as well as the incorporation of significant amounts of intrinsic water. Although most widely recognizable in its black form, obsidian can occur in a broad range of colours and varying levels of opacity; it can exhibit significant heterogeneities in terms of composition and colour, and it is not uncommon for crystals to be incorporated within the glassy network.

Although the most common colour, black, is attributed to iron nano-inclusions within the glass, the exact nature of colouration in other types of obsidian is not well understood. Spectroscopic and nanoparticle analytical techniques may be able to reveal it. Due to its high water content, obsidian cannot be easily manipulated under heat, as common glass can be. However, it can be mixed with common glass to overcome this limitation. Viscometric techniques should provide insight into the differences in rheological properties among various obsidian types and offer an effective method to reusing it in the creation of modern artefacts.

Keywords: Obsidian, natural glass, colour, viscometry

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