Injection-moulding glass into any shape

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Silica glass is produced by heating silicon dioxide until it melts. It has high chemical stability and durability. Manufacturers have increasingly used polymer-based products, which often have inferior properties and have become environmental contaminants. Polymers can easily be shaped by injection moulding – heating the material until it softens before injecting it into a pre-formed mould – usually at 200–250˚C. By contrast, silica glass melts at around 2000˚C.

Silica glassware has resistance to high temperatures and transparency in certain parts of the electromagnetic spectrum

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This is injected into the desired shape and allowed to set. The object is then placed into an oven at 1300˚C, causing the binder to evaporate and the particles to fuse together. The new technique could have technical and environmental benefits.

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1. What is the raw material used for making silicon dioxide?
2. Explain why polymers have often been used instead of glass.
3. Describe the environmental problems caused by using polymers.