

# Density Determination of Irregular Shaped and Small Glass Fragments by Stoke's Law: An Alternative Technique for the Forensic Analysis of Glass

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Glass fragments are one of evidence that can be found in many crime scenes and used to include or exclude suspects or victims from the criminal event. For many years, a typical method known as a sink-float method has been used in many investigation laboratories to prove the correspondence between the questioned glass fragments and the reference ones by matching their density values. However, the major drawback of the method is to use toxic solutions such as Bromoform and Bromobenzene in the investigation process. To overcome such as a drawback, a technique based on the Stoke's law is proposed in this study. By using two known properties of fluids in the analysis, size, and shape of the questioned glass fragments are unnecessary. Five types of the sample glass fragments are examined: laboratory glassware, glass bottles, car glass, architectural glass, and kitchenware glass. To verify the technique, the density of all glass fragments obtained from the proposed technique are crosschecked against the ones measured by the buoyancy method of ASTM Standard test method (C693-93). The results reveal that the density of glass fragments was close to the reference values. This shows the potential of the proposed method in determining the glass density in the forensic analysis.

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