

**PROFICIENCY TESTING @ FORENSIC FOUNDATIONS**  
**2019-2 Chemical Criminology - Glass**

**MANUFACTURERS INFORMATION**

Introduction

The test was designed to replicate broken glass as a result of a robbery

Scenario

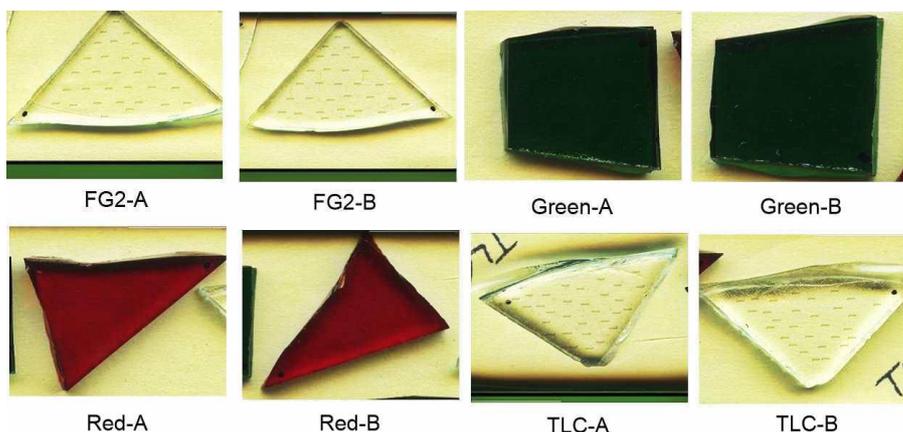
A break and enter occurred at 36 Korong Road, East Alberton. Access was gained by smashing the small 'lead lighted' sidelight beside the patio door and accessing the lock from inside. Jewellery and electrical goods were stolen. Occupants left the premises to take their children to school at approximately 8:30 am 4/4/2019 and returned at approximately 8:55 to find premises broken into. Person of interest (Jamie Murray) located in East Alberton at 10:45, 4/4/19 and clothing (shorts and a grey fleecy synthetic hoodie) seized shortly after (11:15). No tools were found on Murray.

Crime scene examiners collected samples of glass from the window. Only small pieces of glass remained in situ so the reference samples are small. All pieces of reference glass were placed into a small plastic pot (Item 2).

Hoodie from Murray was shaken, debris collected and transferred to a small plastic pot (Item 1)

Sample Production

Red and green coloured leadlight glass was obtained from single sheets. Clear glass was obtained from a preparative TLC plate (identifier TLC) and from a sheet of glass from a framed print (identifier FG2). A small piece of each glass, approximately 1-2 cm<sup>2</sup>, was cut from each sheet and subjected to laser ablation – inductively coupled plasma mass spectrometry analysis in order to evaluate the elemental composition of the pieces and the homogeneity of the distribution of the elements. The glass pieces were coarsely pulverised in plastic Eppendorf tubes using a 3 mm spear-point ceramic/glass drill bit. Sub-samples of each were collected for determination of the refractive index of each glass and to determine the homogeneity of this property within the glass pieces.



### Test 'Unknown' Item

The test 'Unknown' item was prepared by first depositing quartz sand grains into a small screw-capped plastic pot. The quantity used was as shown in Figure 1a. Next, 4 red glass fragments, then 5 green glass fragments and finally 7 fragments of TLC glass were added to the pot (Figure 1b, 1c, and 1d). Finally, some red nylon carpet fibres, some hessian carpet backing fibres and some human limb hairs were added to the pot; Figure 1e shows the item at this stage. It was then sealed circumferentially with adhesive tape for dispatch. The sizes of these pieces of glass ranged from about 1-2 mm, which is a size typical of casework. It was confirmed that although the pot into which the materials were deposited is plastic, it was still possible to subject the materials to polarized light microscopy, which would allow participants to determine that the quartz sand is not glass.

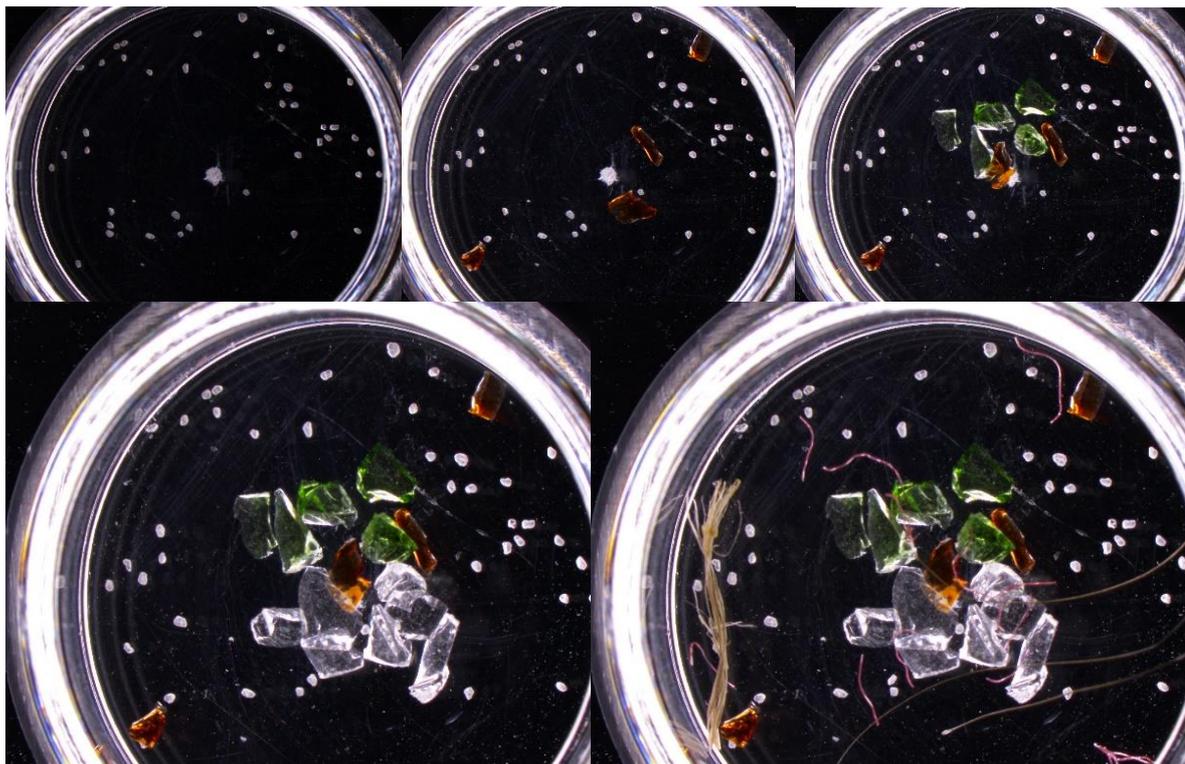


Figure 1. a) top left, plastic pot bottom with 41 grains of quartz sand. The prominent spot in the middle is a moulding artefact in the plastic, not a particle; b) top middle, sand plus 4 chips of red glass; c) top right, sand and red glass plus 5 chips of green glass; d) bottom left, sand, green glass, red glass plus 7 chips of clear TLC glass; e) bottom right, sand, chips of red glass, chips of green glass and chips of clear glass plus hairs and fibres.

### Test 'Known' Item

This item comprised a screw-capped plastic pot containing chips of the same red and green glass as used for the 'Unknown' Item and chips of clear FG2 glass. All pieces were bigger than those provided in the 'Unknown' item, but were still only about 2-3mm in size. This is smaller than participants might expect for control glass collected by crime scene examiners. However, it was important to ensure that the glass from which the items were drawn was thoroughly tested for elemental and refractive index homogeneity and it was not practical to carry out this verification over large pieces of glass. As a consequence, all the test items had to be drawn from pieces of glass of approximately 1-2 cm<sup>2</sup>, which made it impossible to provide participants with 'Known' items of large size.

### Summary of Test Items:

The Green and Red glass in both the "Unknown Item" and the "Known Item" are from the same source.

The Clear glass used in the "Unknown Item" (sample TLC) is from a different source to the clear glass in the "Known Item" (FG2).

### Homogeneity Testing

Samples of green and red leadlight and the two clear glasses were tested to confirm the composition and refractive index.

10 pieces of each type of glass were pretested before distribution to verify their homogeneity and determine their composition and refractive index.

The glass was tested for elemental properties using Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) and for Refractive Index (RI) using Grimm II (Oil Immersion/ Variable Temperature).

Some variation was found in the green glass but this should not be significant enough to cause problems in differentiating between samples.

NOTE: Elemental composition is not included as part of the Manufacturing Information but is available on request. Facilities involved in the test did not report the elemental composition so it has been decided to not include our results as they may be used in future tests.

#### REFRACTIVE INDEX.

Duplicate measurements were carried out on randomly selected glass fragments to verify their homogeneity.

The stability of the instrument was also determined using two calibration standards tested two weeks apart. The results of the two calibration tests provided values with a mean difference between runs of less than 0.00015 and maximum within run range of 0.00027.

<b>Sample ID</b>	<b>Refractive Index</b>	<b>Range</b>
FG2	1.5152(7)	0.0001(8)
Green	1.5166(1)	0.0007(1)
Red	1.5115(0)	0.0003(1)
TLC	1.5161(3)	0.0001(0)

NOTE: Further statistical information concerning homogeneity is available if required.

END OF DOCUMENT