Forensic X-ray Fluorescence: Hit-and-Run

Forensic scientists collect and analyze evidence at crime scenes to determine link between people and places. Essentially, they help to answer the question of who was there and what happened. Often the types of evidence that forensic scientists work with cannot be seen with the unaided eye and require tools such as “black lights” and X-ray Fluorescence (XRF). One way XRF is used in forensics is to identify various trace elements found in glass. Since glass is derived from sand and sandstone, it contains the unique trace elements from the source sand. Forensic scientists use the glass’s trace element “fingerprint” to identify where the car was manufactured and if it has any link to a crime scene.

Image that you’re a forensic scientist whose task it is to determine what happened in a hit-and-run car accident. At the crime scene, microscopic glass fragments from the car’s windshield are found on the victim’s body (Glass A). The police locate an abandon car with serious damage that fits a witness’s description. The owner of the vehicle (i.e. suspect #1) claims his vehicle was stolen earlier that night and he wasn’t involved with the accident. After obtaining a search warrant, your team searches the suspect’s home and collects a small glass fragment embedded in the suspect’s jacket (Glass B).

Both glass samples have been analyzed with the handheld XRF to determine their trace element compositions. Here are the resulting spectra:

![Glass A spectrum](image)
1) Using the periodic table with the various X-ray energies shown (page 3) and the elemental components of glass provided, identify all the elements in the two glass samples (Label each peak with its respective element).

2) What elements do the glass samples have in common? What elements are unique? Do these samples have the same origin?

3) Is there enough evidence to say the suspect was or wasn’t involved in the crime?
### Periodic Table of Elements and X-ray Energies

[Image of periodic table]

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**Handheld XRF**