

XRF/PIXE

By The Gamma Group

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What is the purpose of XRF?

- X-Ray Fluorescence(XRF) is used to identify the elemental composition of a target material.

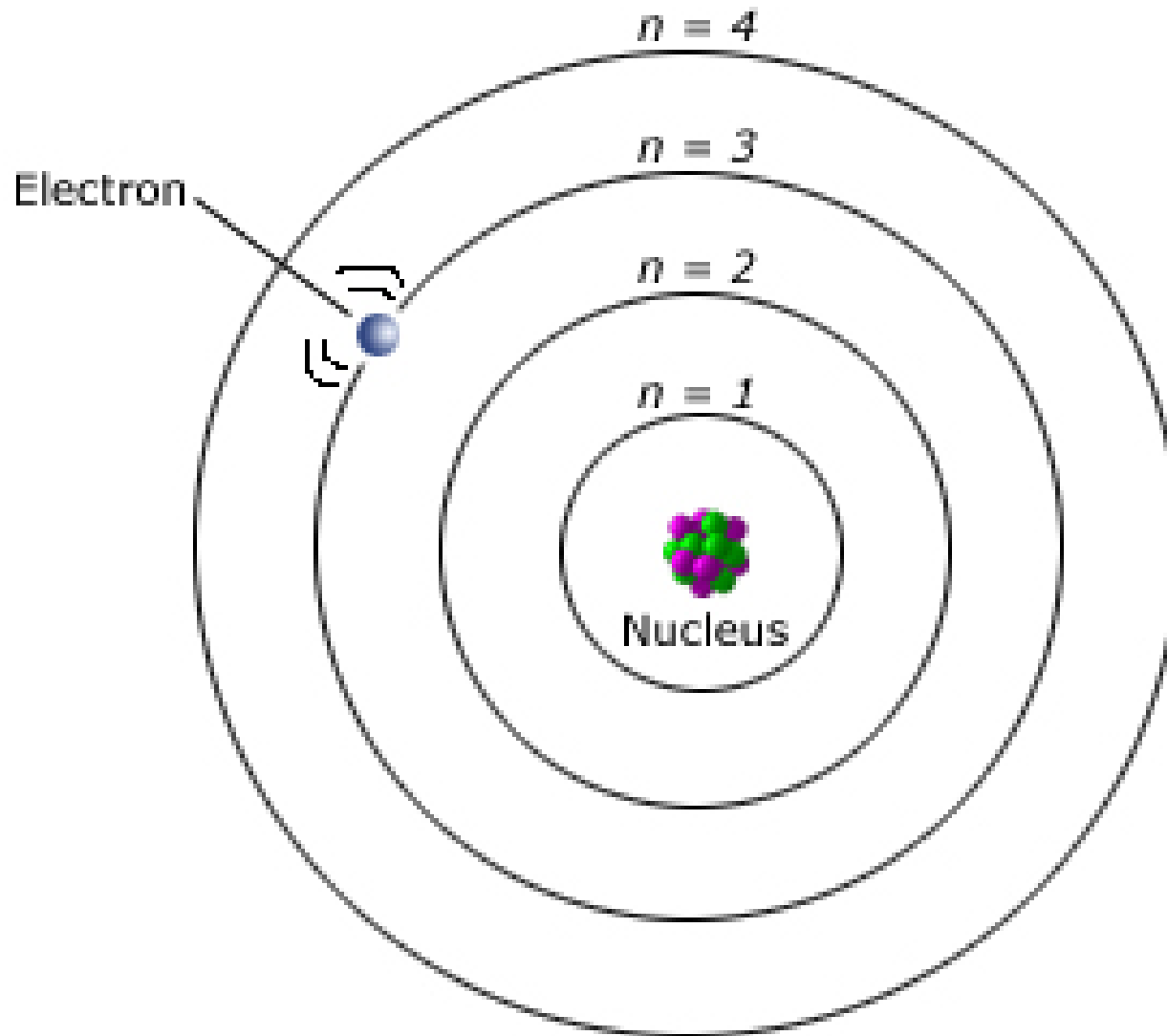
What is PIXE?

- Proton Induced X-Ray Emissions(PIXE) is just a much larger and more sophisticated technique for identifying elemental compositions.

How does XRF work?

- X-rays are produced by the decay of Americium-241.
- These X-rays induce X-ray emissions in the target by knocking out electrons from the lowest energy level (K Shell) of the target atom.
- These missing electrons are replaced by electrons from higher energy levels which leads to the production of K X-rays
- The photons are detected in a detector and the energy of those photons allows one to identify the elemental composition of the target material.

Bohr's Model



How does PIXE work?

- A proton beam is produced and then accelerated toward a specific target.
- The proton beam is produced by a FN Tandem Van de Graaff Accelerator.
- The protons knock electrons out of the target atoms just like in the XRF method but with greater precision.
- The sensor cannot detect any energy levels below those of Na (Sodium).

XRF Set-Up



FN Set-Up

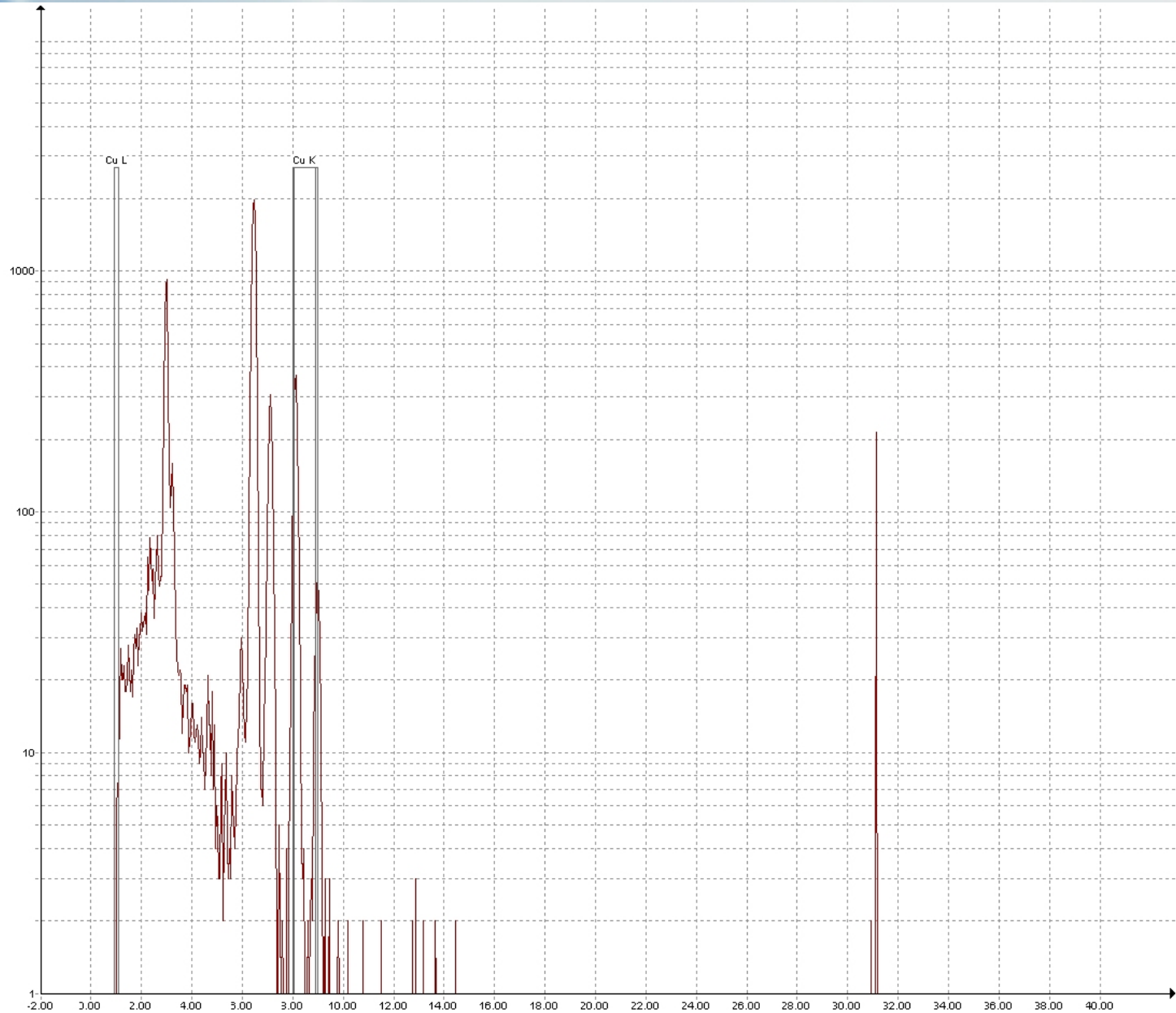


FN Tests



Screw 1

■ Mn, Fe, Cu



Screw 2

- Ni, Ti, Cr, Mn, Fe, Cu, Zn



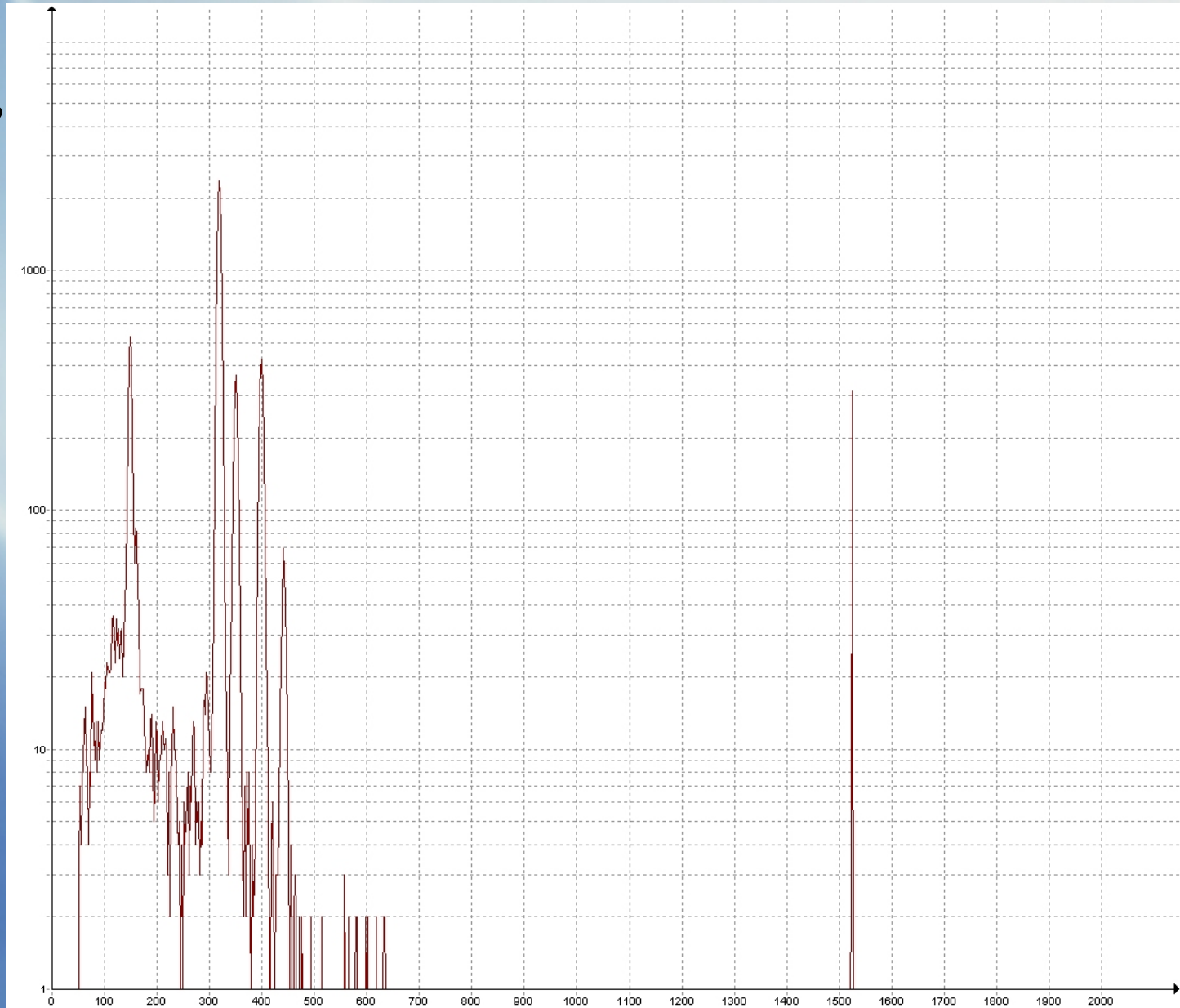
Screw 3

- S, Ti, Mn, Fe, Ni, Zn



Screw 4

- S, Al, Ti, Cr, Mn, Fe, Cu



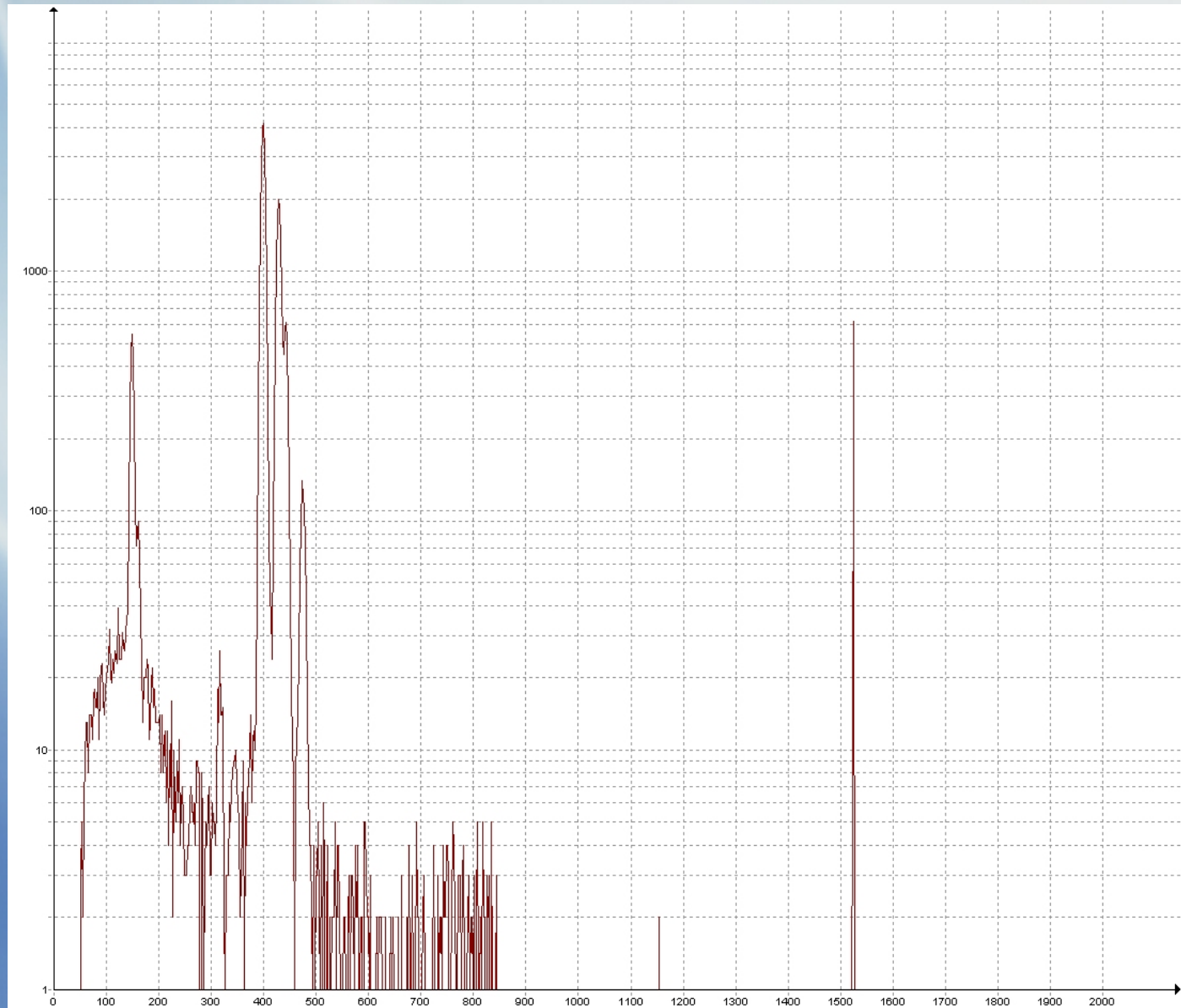
Screw 5

- Ti, Cr, Mn, Fe, Zn, Se



Screw 6

- Fe, Cu, Zn



Crime Scene Samples

- In the XRF, we found that both samples were made up of KCl.
- In PIXE, we still found that both samples had KCl in them but the sample taken from Casey's house had a lower concentration of Cl.

- Thanks to all the teachers and instructors who volunteered their time this week.