

## Feasibility study on explosives using synchrotron radiation: Chemical fertilizers

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### Abstract:

In this work, chemical fertilizers that used as explosive stimulants were analyzed based on synchrotron radiation by using X-ray Photoelectron Spectroscopy (XPS) and Wide Angle X-ray Scattering (WAXS). It was known that an explosive was defined as a material which contained a large amount of energy stored in chemical bonds. The energetic stability of gaseous products, and hence, their generation came from the formation of strongly bonded like carbon (mono/di)oxide and (di)nitrogen. Consequently, most commercial explosives were contained with -NO<sub>2</sub>, -ONO<sub>2</sub> and -NHNO<sub>2</sub> groups which when detonated release gases like the aforementioned ones, e.g., nitroglycerin, TNT, HMX, PETN, nitrocellulose, etc. It was revealed that the elemental compositions, especially N was found in most of the explosive and fertilizer. Scanning electron microscope coupled with energy-dispersive X-ray fluorescence spectroscopy (SEM-EDS) and Proton induced X-ray emission spectroscopy (PIXE) were also carried out to characterize them. XPS and WAXS spectra showed the characterized peaks in the various samples. The elemental analysis showed the presence of trace elements. Explosives and fertilizers have differences in specific compositions. It can be concluded that these methods seem to be used as fingerprint to identify the various explosives and fertilizers.