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The Nuclear Barcode: a New Taggant for Identifying Explosives

JAMES SEMAN, CATHERINE JOHNSON, CARLOS CASTAO, Missouri Univ of Sci & Tech — Creating an effective taggant system for explosives is a challenging problem since the taggant used must be designed to endure the detonation process. A new taggant for use in explosives has been recently developed and named the ‘nuclear barcode’. The nuclear barcode tags explosives by adding low concentrations of eight different elements to the explosive, and then reads the tag from the post-blast residue using neutron activation analysis (NAA) to identify the elements and their concentrations. The nuclear barcode can be used to identify explosives after detonation by sampling the post-blast residue that is deposited due to incomplete reaction of the explosives. This method of tagging explosives creates an identifying taggant that survives detonation as NAA detects atomic nuclei as opposed to using any chemical or physical properties of the taggant that don’t always survive the detonation process. Additional advantages this taggant method offers is ease of recovery of the taggant after detonation, and a total of 25.6 billion possible taggants as currently conceived, which enables the nuclear barcode to be used to tag individual batches of explosives. This paper describes the development of the nuclear barcode taggant system and its potential use in the explosives industry.

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