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## AN ADVANCED METHOD FOR THE EFFICIENT QUICK SEPARATION AND QUANTITATIVE ANALYSIS OF FLAME RETARDANT ARAMID FABRIC

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**N**omex IIIA (NIIIA) is the most common Flame Resist/Retardant (FR) protective clothing used in an emergency situation by first responders such as fire fighters, aviators and Military personnel. It is the blend of nomex or poly (metaphenylene isophthalamide) (93%), poly (paraphenylene terephthalamide) or kevlar (5%) and poly (hexamethylene adipamide), or nylon (2%). FR property and hence the protection level of this protective clothing is decided by the chemical composition ratio of the NIIIA fabric. Therefore, the material has to be properly analyzed as a part of the quality assurance of the products before it is supplied to the users such as armed forces. There is no reported method in the literature for the separation and quantitative analysis of this fabric because of the inherent solubility problems associated with the individual components. In the present study, a novel technique, pressurized

liquid extraction (PLE) process has been employed for the quick and complete separation of nomex and Kevlar from the aramid blend using dimethyl acetamide (DMAc) and lithium chloride. Extraction was carried out at different temperatures (50, 75, 100, 125 & 150°C) for various time duration at a constant pressure (1500 psi). Complete separation was found to be at 100°C with three static cycle's extraction of 3 min each. The chemical composition of the NIIIA blend was found to be 92.87% of nomex, 5.01% of kevlar and 2.11% of nylon as determined by gravimetric analysis. Further, the separated constituents were characterized by TGA and FTIR for the confirmation of their physicochemical properties in comparison to the respective standards.

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