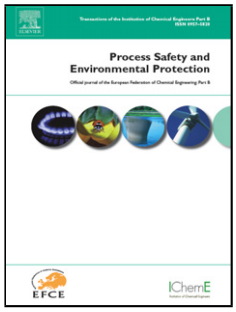

Title: Impact Of Nano Particles On Safety And Environment For Fireworks Chemicals

Author: A Azhagurajan N Selvakumar

PII: S0957-5820(13)00096-7
DOI: http://dx.doi.org/doi:10.1016/j.psep.2013.12.007
Reference: PSEP 397

To appear in: *Process Safety and Environment Protection*

Received date: 15-7-2013
Revised date: 29-11-2013
Accepted date: 27-12-2013

Please cite this article as: Azhagurajan, A., .Selvakumar, N., . Impact Of Nano Particles On Safety And Environment For Fireworks Chemicals, *Process Safety and Environment Protection* (2014), http://dx.doi.org/10.1016/j.psep.2013.12.007

IMPACT OF NANO PARTICLES ON SAFETY AND ENVIRONMENT FOR FIREWORKS CHEMICALS

A.Azhagurajan[1*], *N.Selvakumar*[2]

[1*]Associate Professor, Department of Mechanical Engineering, Mepco Schlenk Engineering College, Sivakasi – 626 005, Tamilnadu, India.

Phone: +91 4562-235000, Fax: +91 4562-235111; e-mail: a_azhagu@yahoo.co.in

[2] Professor, Department of Mechanical Engineering, Mepco Schlenk Engineering College, Sivakasi – 626 005, Tamilnadu, India, e mail: nselva@mepcoeng.ac.in

Abstract

Pyrotechnic devices, commonly known as fireworks, have a huge popularity. The sonic effect produced by the fireworks mainly depends upon the chemical composition of the mixtures and the particle size. Specifically this means that larger the particle size, more the quantity of powder mixture is to be used. Therefore, a high quality product which can produce the expected noise level with lesser quantity of chemicals is a major challenge faced by the pyrotechnic industry. This can be achieved by adopting either of the two approaches namely, one, by changing the chemical composition or by changing the particle size. At present the particle size of the chemical composition is at the micron level. However, by converting the composition into nano size, the volume of mixture used will be greatly reduced without compromising the sound level produced. The major advantage of using nano size powders is that it is essentially environmental friendly, producing less pollution and ensuring a cleaner environment. Concurrently, the major risk in using nano size powders is that it is a fire hazard. In this paper, the various pros and cons of using nano powders in the manufacture of fireworks have been analyzed, collecting data from various research works and presenting the same as a review article.

Keywords: fireworks, flash powder, nano, micron, hazard

1. Introduction

In the pyrotechnic industries, fireworks are manufactured commercially with pyrotechnic chemicals. The chemicals used are oxidizer, fuel and optionally, a colour enhancing chemical and a binder [1-3]. The utilisation of the chemicals and their composition vary depending on the type of fireworks being produced. The performance of the fireworks is