Review of an Adequate Chemical Dust Suppressant Used for Prevention of Dust Explosions in Food Industry

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Abstract

Recent dust explosion and subsequent fire at the Imperial Sugar refinery in Port Wentworth, Georgia and numerous other industrial dust explosion incidents over the past 25 years have raised serious concerns about combustible dust hazards in the workplace. Suppression of explosion in its early stages is a common approach used to reduce explosion consequences. Currently, there are two types of suppressants used to combat dust fires: solid suppressants such as mono-ammonium phosphate (MAP), NaHCO$_3$, and gaseous suppressants such as nitrogen and CO$_2$. The present paper reviews the advantages and disadvantages of these two types of suppressants in order to identify characteristics that influence each of the effectiveness measures that could be integrated into a new binary solid-gas suppressant. In addition, some experimental studies to explore the suppressant effectiveness are proposed for future in-house tests.