A Heat-Sensitive, Self-Activating, Easy-To-Launch Fire Grenade Device

Patel, Prachi (School: Shree Cutchi Leva Patel Samaj School)
Mutiso, Tina (School: Shree Cutchi Leva Patel Samaj School)
Halai, Yashvi (School: Shree Cutchi Leva Patel Samaj School)

In 2019, a series of fires claimed nearly 100 lives in Bangladesh, and a massive fire tore through several multistory buildings in Chawk Bazar. The blaze originated at a warehouse that had allegedly stored highly inflammable chemicals illegally and resulted in the deaths of at least 71 people and numerous injuries. This project designs and optimizes FireIce gel, fire suppressant powder, and a hybrid formula, and tests three casing materials: biodegradable shells, thin ceramic casings, and wax-coated shells. Deployment methods included drop testing, catapult launching, and drone deployment. Three fire suppressant powder formulations were tested for flowability, density, and dispersion efficiency. FireIce gel formulations with different concentrations of polyacrylamide, guar gum, calcium chloride, and potassium bicarbonate were tested for thermal stability, viscosity, and adhesion. The 70:30 hybrid formulation showed the best overall performance. Thin ceramic shells allowed optimal breakability and biodegradable casings offered green disposal. The torsion catapult had the best compromise between range and accuracy. The project concludes that optimized powder and gel compositions, effective casing materials, and deployment strategies can significantly contribute to managing fires in industrial, and emergency conditions and prevent the loss of many lives.

Awards Won: