A LETHAL ACCIDENT IN A CARBONATE PHOTORESIST DEVELOPER TANK

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Objectives: Carbonate photoresist developer has widely used in the process of image formation in the photo-electric industries. The hydrated alkaline material is thought to be low level of toxicity and causes mild corrosive injury to skin and mucosa. In 2009, an accident of 2 workers were found to be cardiac arrest in a tank with few residual fluid. Detailed field investigation did not find the causes of death. Developer fluid chocking was suspected to be the mechanism of this lethal accident by forensic pathologist. Methods: The developer fluid consists of 5% sodium bicarbonate, 5% sodium carbonate, 5% ionic surfactant, 9% non-ionic surfactant and water. Each component 10 ul was tested in 10 ICR mice from cutting tracheal. Mice were sacrificed 6 hour later and lung pathology were studied.

Result: There was no mice dead in group of normal saline, 5% bicarbonate, 5% sodium carbonate and 5% ionic surfactant. However, all mice dead in few minutes if developer fluid instilled into the trachea. The mortality rate was 100%, 40% and 20% with each 5%, 0.5% and 0.25% nonionic surfactant respectively. Enlargement and heavier lung with pathological findings of slight epithelial cell degeneration/necrosis in the bronchioles were noted in the developer and 5% nonionic surfactant treated mice.

Conclusion: Aspiration of carbonate developer intoxication might lead to respiratory distress and death. The toxicological principle might be the nonionic surfactant. Therefore, wearing a protective mask is recommended in a possible spray of carbonate developer in an occupational setting. Further research is needed to elucidate the mechanisms involved in carbonate developer poisoning in humans.