Identification of Zinc or Aluminium Phosphide in Agricultural Commodities by Phosphine Generation using Gas Chromatography

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Zinc phospide (Zn_3P_2) and aluminum phosphide (AlP) are well known rodenticides which are used to control insects and rodents especially at grain storages. In the aqueous or acidic medium metal phosphides releases phosphine gas (PH_3) which is harmful to rodents, who do not have a vomiting reflex. Exposure of higher concentrations of PH_3 can be harmful to domestic animals and even human life. The $AgNO_3$ test was conducted to acquire a draft idea about the presence of metal phosphide in the samples. For the analytical purpose, samples were hydrolyzed with aqueous sulphuric acid inside a gas chromatography-headspace (GC-HS) vial. Toluene was used to trap the released PH_3 and the vials were roller mixed to get a better extraction. The toluene layer was separated and inspected by gas chromatography–nitrogen phosphorous detector (GC-NPD). Metal identification of the chemical compound was done using inductively coupled plasma mass spectrometer (ICP-MS). Only one sample out of five tested samples showed positive contamination with metal phosphide. The ICP-MS results confirmed the presence of AlP in the suspected chemical compound. This method could be used to identify metal phosphide contamination in agricultural commodities like rice, dhal, coriander and other grains.

Keywords: Metalphosphide, phosphine, toluene trapping

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