

POLLUTION CONTROL AND SAFETY

Safety is a factor that needs to be considered seriously, whether it is a laboratory or a large-scale industrial process, particularly in case of nitrations, which involve highly exothermic reaction leading to formation of explosive substances and intermediates. Word safety does not just signify an accident-free production of nitro compounds but also shall give a stable main product as well as by-products [spent acid]. Safety in transporting of nitro compounds and also in preventing pollution of environments is an obligation of the technologists to the society in which he lives.

Safety starts with good house of the place of work. For nitration reaction equipment that has good temperature control, smooth and frictionless components and with the facility for remote control and interlocking devices would be advantageous. For selection of raw material strict quality control and adherence to the laid down specifications should be followed. During the process if some undesirable components are not removed then unsafe condition may prevail.

Building in which nitration is carried out should have good ventilation. Acid fumes from nitrators as and when formed should be removed by effective fume ducting system. If the quantity of fumes is substantial, then fumes from the nitrators can be sent to a scrubber. Aqueous washings or effluents from nitration plants are acidic and may contain traces of nitro compounds also. The effluents must be disposed after treating them with lime in lime pits. Traces of nitro compounds in the effluents can be got rid off by destruction of nitro compounds. Reduction with iron and concentrated HCl is one of the methods.

Mononitrotoluene is a toxic substance. Maximum allowable concentration for the mononitrotoluenes (MNT) is 5ppm (30 mg/m³). It is readily absorbed by contact with skin and by inhalation of vapor. Primary effect of nitrotoluene is the conversion of hemoglobin to methemoglobin; thus the conversion eliminates hemoglobin from the oxygen transport cycle. Mononitrotoluenes are low-grade methemoglobin formers. They

represent moderate fire hazards when exposed to heat or flame. Alcohol ingestion tends to increase the toxic effects of nitrotoluene. Impervious protective clothing should be washed thoroughly with soap and warm water. In areas of high vapor concentration (1 ppm), full face masks with organic – vapor consist or air supplied respirators should be used.

Mononitrotoluenes are moderate fire hazards when exposed to heat or flame. They are not classified as explosives.

o-nitrotoluene and p-nitrotoluene are considered hazardous chemicals due to flash point near 100⁰C. M-nitrotoluenes does not fall in to this category but it is advisable to handle all these materials as hazardous flammable compounds.

Toxic properties of these substances are similar to those of nitrobenzene but less pronounced. Nitrotoluene cause some bodily reactions, and are readily absorbed by contact with the skin, inhalation and ingestion. Handling of these compounds should be carefully controlled with precaution and procedures.