

Study and Recommendations for Safe Handling of Chlorine in Industry

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Abstract— Chemical emergencies arising from hazardous chemicals are not uncommon in India. Hazardous Chemical, being at the core of today's industrial systems, has gained a very serious concern for Emergency management in community. The elements which are at highest risks due to hazardous chemical accidents primarily include the industrial plant, its employees & workers, hazardous chemicals vehicles, neighboring industry, its occupants and surrounding community. India has witnessed the world's worst chemical (industrial) disaster "Bhopal Gas Tragedy" in the year 1984. The Bhopal Gas tragedy was most devastating chemical accident in history, where over thousands of people died due to accidental release of toxic gas Methyl IsoCyanate (MIC). Such accidents are significant in terms of fatality, injuries, damage to industry property and environment. Only in last decade, more than hundred significant chemical accidents reported in India, which resulted into hundreds of death and thousands of injuries. There are thousands of registered and hazardous factories and un-organized sectors dealing with numerous range of hazardous material posing serious and complex levels of disaster.

Key words: Safe Handling, MIC

I. INTRODUCTION

We will be discussing about one hazardous chemical that is chlorine, understanding chlorine is a certain way of avoiding its occurrence and limiting its chances of turning in an emergency and subsequently a disaster.

Chlorine is the byproduct of caustic chlorine industry. There is more than 50 caustic chlorine plant in India, producing chlorine 3 million tons which is hardly 4% of global production comparing to the global chlorine production of approximately 80 million tons in year.

Chlorine was researched in 1774 by William schelle-sweden chemist. Liquefied by Thomas north more in 1805 by compression. Manufacturing of liquid chlorine started in 1888 followed by 1st chlorine plant in 1890 in waste Germany and 2nd chlorine plant in USA, while in 1941 in India.

Previous chlorine was used as bleaching material. Now a day's it is utilized from rocket fuel to food products and water treatment. Life without chlorine is impossible; it is like gift to mankind till it is contained. It has a great potential on release and affect environment and health. 80% of accident is taking place due to lack of knowledge or overconfidence. To handle chlorine safely proper design of system and sound operating practices are to be worked out.

II. SCOPE

This paper covers the hazards associated with chlorine, safe handling procedures, emergency equipment and recommendations to improve the handling of chlorine and to prevent/control the exposure.

III. OBJECTIVE

"The main objective of the research is to reduce the exposure to hazards present in handling of chlorine in industries and to prevent the occurrence of accidents. Other objectives are:

- To learn the various properties of chlorine
- Hazard associated with chlorine
- Emergency Response against Chlorine Release
- Safe system of work
- Chlorine Leak and Control

IV. METHODOLOGY

The following method was adopted to achieve the objective of this research.

- Studied operating and maintenance procedures and work methods.
- Studied the applicable rules and regulations
- Studied previous injury and Accident Investigation records
- Conducted safety culture survey with sets of questionnaire
- Inspected various places of the workplace and identified hazards present
- Studied the emergency equipment to be used to mitigate the emergency.
- Communication and feedback from the operation workers.

V. RESULTS AND DISCUSSIONS

The following points are results of the above methodology

A. Emergency Notification on Timing System:

In any emergency event, it is very essential that, notification of the emergency shall be passed as quick as possible to the emergency service providers which helps in mitigating the emergency very effectively and efficiently. Delayed notification of emergency often results in disaster. Emergency notification on timing system enables users to send notifications of emergencies to individuals or group using the appropriate software. Information is being sent of target group according to the level and type of emergency via SMS, EMAIL and on Telephone. All the relevant information/notification can be sent by just one click, before, during, and after the emergency events.

B. Replacement/Modification of Chlorine Leakage Kit

It is very true in the industry that emergency service provider has to perform vary vital role in any accident relates to hazardous chemical. If we talk about chlorine leakage, they must work in the hazardous atmosphere for the considerable time to arrest the leakage. Many industries are using the chlorine leakage kit type B having tie- rods, which

needs to set first to arrest the leakage. Emergency crew has to attach tie rods with chlorine tonner. From the experience it is learned that attaching the tie roads with horizontal bar is time consuming task. To make it more simple, tie rods can be pre-attached using chain, which ultimately reduces the exposure time.

It is learned that in some of the chlorine kit the handle for tightening of hood is very large in size, which is not suitable to arrest the chlorine tonner leakage if the chlorine tonner surrounded by the cover/pit/process accessories. It is recommended to have a small handle which can easily seal the hood in very congested space resulted in reducing the exposure time.

C. Training

From the study of past chemical accidents, it is learnt that accident are happing due lack of competency in performing the job. Individual behavior towards their work is also plays a very important role. A systematic training approach helps in mitigating those accidents. Training Matrix should be prepared, implemented and audited. Training Matrix using the latest software keeps informed the identified trainees about trainings to be completed, validation, schedule of refresher training etc.

D. Supervision

In any industry, handling hazardous chemicals, there are number of process. It is not possible for the supervisor to be present physically at all the times as he has to supervise many process areas. Hence, it is recommended to install the Close Circuit Television Cameras at strategic locations in the plant. Supervisor can monitor different work stations at any time from the control room itself.

VI. CONCLUSION

At the end of this research we can conclude that, to mitigate the emergency arise from the hazardous chemical like chlorine, it is very very essential to improve the safety systems we are following in industry. The requirements mentioned in the acts and lows are the minimum. As the hazardous chemical accidents are still happening we need to go ahead the rules and regulations to achieve the target of "ZERO ACCIDENTS".

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