A Study on Various Hazards and Remedies of Hazardous Chemicals

1. Gokulram. M, 2.Karthik Raja. L, 3.Anjali Jose, 4.Raghu K.M

1. PG Scholar, Industrial Safety Engineering, K.S.R College of Engineering, Tiruchengode, Tamil Nadu, India
2. PG Scholar, Industrial Safety Engineering, K.S.R College of Engineering, Tiruchengode, Tamil Nadu, India
3. PG Scholar, Industrial Safety Engineering, K.S.R College of Engineering, Tiruchengode, Tamil Nadu, India
4. Assistant Professor, Industrial Safety Engineering, K.S.R College of Engineering, Tiruchengode, Tamil Nadu, India

ABSTRACT:

The hazardous chemicals are the highly toxic and reactive substances used in the industries.The hazard is the probability of risk or danger. It is a source of accidents and adverse health effects. In this study the review of journals and accidents that happened due to hazardous chemicals in various industries in Tamil Nadu has been studied. The methods of safe handling of hazardous chemicals in industries are mentioned to prevent adverse health effects, accidents, injuries and to prevent environmental damage.

1.INTRODUCTION:

The various hazards in industries must be identified and rectified before an accident or adverse health effects take place. The study of various accidents happened in Tamil Nadu has been carried out to identify the major hazards due to hazardous chemicals.Most of the chemical accidents takes place due to improper use of PPE, improper handling, improper storage, improper disposal of waste. The various safe handling methods in industries has been explained.

2.HANDLING METHODS :

Juan et al or indicated right major causes for accidents namely mechanical failure, impact, human factors, instrument failure, service failure, violent reaction, external events andupset[7]. The industries are using various kinds of hazardous chemicals like flammable materials, explosive chemicals, corrosive materials, toxic substances, heat sensitive materials, oxidizing agents, gases under high pressure, water sensitive chemicals and radioactive materials[2]. The chemical accidents during transportation are the main issues for a public safety[10]. The improper handling of chemicals without the use of proper personal protective equipment leads to adverse health effects. The improper way of disposal of chemical waste into the environment pollutes the natural environments.Careless in maintaining, proper housekeeping, orderliness and labelling of various chemicals leads to accidents and sometimes even leads to explosion and loss of life.

2.1FLAMMABLE AND EXPLOSIVE CHEMICALS:

The organic chemicals are usually flammable chemicals. The dust of organic materials and dust of metals like aluminium, magnesium, and sodium may be easy to ignite and explode in the air[2]. Flammable gases like hydrogen, acetylene and methane are easy to ignite and may burn with explosion. The possibility of ignition sources should be avoided. Spark proof exhaust fans should be used if exhausting flammable and corrosion resistant proof in handling explosive chemicals.To avoid fire hazard ignition sources to be eliminated by providing static electricity and using ion sparking tools for maintenancejobs[2].

Protect the hands with rubber gloves while handling corrosive liquids. Separate storage for trash, waste chemicals and broken materials should me provided and cleaned periodically. Rigasindicated that accidents are classified due to the hard substances based on three different types; there are dispersion, fire and explosion[12]. Kevin et al indicated that in daily life in the explosive flammable and toxic are more dangerous hazards when improperly released[8]. As per the recommendation of tariff advisory committee, the fire alarm and firefightingequipments should be provided in industries. Plenty amount of water for flushing chemical burns and first aid kit should be present in the easily accessible areas for workers in industries. Explosive meter is used to locate gas leak and reduce the risk due to explosion or prevent explosion. Sivaprakasam et al indicated that in India, fireworks manufacturer is generally carried out their work manually due to sensitive nature of the chemical mixtures to thermal, mechanical and electrical hazards[13].

2.2CORROSIVE CHEMICALS:

Corrosive chemicals can damage the skin, eyes, respiratory tract, digestive tract, metals

installation building components made from unsuitable material and other equipments. When acids attack metals, hydrogen gas is after given off. This flammable gas can explore, if an ignition source is present. Sodium hydroxide and potassium hydroxide also attack some metals like aluminium,zinc, galvanized metals and tin to produce hydrogen gas some corrosive chemical reactive and given off toxic gas. PVC gloves gum bots and PVC woods are to worn in handling acidic and alkali equipment like polyvinyl chloride.

Spillage of chemicals should be washed properly with water. Proper labelling of waring symbols and mentioning their toxic effects on each chemical can reduce the health hazard. Proper use of gloves must be earned while handling corrosive chemicals. Rubber lines can be used to handle phosphoric acid.

3.HEALTH CONSEQUENCES:

The concentrate acids such as sulphuric acid can cause severe burns in skin. Inorganic hydrocarbons can cause serious damage to skin tissue because a protective protein layers do not form.Even a dilute solution such as potassium hydroxide or sodium can attack skin with the fat tissues and forming a soapy, slick film. The contact of skin with low concentration of hydrofluoric acid (HF) causes painful damage to tissues. Some chemicals can cause immediate blindness. The health hazard can be prevented by the use of proper personal protective equipments such as googles, gloves and shoes.

4.PREVENTIVE MEASURES:

William noted that in process industries reactive chemical incidents have led to numerous losses and have affected the society[15]. Jagar stated that in a chemical industry an explosion hazard may exist when the dust materials are produced, stored or processed and these materials are present as a mixture of air[6]. The preventive measures to avoid pollution and spillage are as follows.

The formation of dust in hazardous chemicals will be present in industries. These dust particles can enter the human body through the process of inhalation and ingestion. The dust can be collected and stopped from the source itself by the use cyclone separator or scrubber. Wanda et al indicated that very dangerous chemicals involved in major accidents are sulphuric acid, hydrochloric acid, ammonia, sodium hypochlorite and carbon monoxide[14].Marlair explained that in solid physical state, at normal temperature and pressure ammonium nitrate is chemically stable[9]. The ammonia nitrate may cause fire and explosion.Hayashi et al avoid the corrosive condition the chemical contaminations in the water should be monitoredperiodically[4].

The proper care should be taken while handling chemicals. The spillage can be drained to separate pits which are assigned to collect the spillages separate containers must be present for toxic chemicals. Water can be used to wash the spillage. For some chemicals, dry chemicals must be used instead of water. According to Hoppe T et al , the preventive measures from the explosion requires at least to meet any one of the three conditions[5];

- To avoid the developed of explosives mixtures.
- To replace the atmosphere oxygen with an inert gas, working in vacuum.
- By preventing the occurrence of effective ignition sources.

Rigas et al stated that working the organic material contents with nitration is a potentially dangerous process, because nitration performs exothermic reaction under suitable condition with explosives substances[11]. Akcil indicated that staff members working in mines has continuously plan and provide detailed accounts of the managements practices and initiatives being undertaken with regard to handling hazardous substances[1]. Fabiano et al noted that economic factors, technology based job design organization of work or environmental conditions and human factors are the several factors that can affect the occupational accidents frequency[3]. The workers should be trained about various sources of hazardous gases and there effects on human beings and they must be encouraged to use breathing apparatus.

5.CONCLUSION:

The proper use of personal protective equipment is mandatory in chemical industries to prevent health hazards. Separate storage must be maintained for different chemicals. Proper place to dispose spillage and other wastes must be maintained. This paper indicates various hazards and safe handling methods to prevent accidents and health risk.

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