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Occupational Health Hazards In Textile Dyeing Units: A Review

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ABSTRACT:

The goal of the current study was to identify health and safety concerns and hazards for workers in the dyeing sector Water is heavily contaminated by the synthetic colors used in the textile industry. Textile colors are released into the aquatic environment as effluent because they do not adhere to the cloth well. As a result, the environment and public health suffer greatly when effluent from several textile factories is continuously released without first being treated. The impact of textile dyes on aquatic vegetation, water bodies, and human health will be covered in this review. By raising the chemical and biochemical oxygen demand, preventing photosynthesis, preventing plant growth, entering the food chain, causing recalcitrance and bio accumulation, and possibly fostering toxicity agency, and carcinogenicity, textile dyes reduce the aesthetic quality of bodies of water. Dye-containing wastewater should be adequately treated using eco-friendly technology to avoid detrimental effects on the environment, human health, and natural water supplies. This study aimed to review the different types of dyes used in industrial process and their contribution to environmental pollution.

Index terms: Hazards, Dyeing Sector, Textile Industry, Wastewater, Eco-Friendly Technology.

1. INTRODUCTION:

The textile industry is one of the largest industries in the world. The textile industry provides jobs without superior skills, which in turn plays a key role in providing employment in poor countries like India, Bangladesh, Pakistan, Sri Lanka, and Vietnam and therefore, plays a dynamic role in the growth of Gross Domestic Product (GDP) value of these countries (Keane and Velde, 2008). The textile dyeing industries have the great potentiality to caused water bodies pollution and the entire environment as well. It is estimated that over 10,000 various dyes and pigments are used industrially and over 7X10 tons of synthetic dyes are yearly produced globally (Zollinger, 1987; Robinson et al., 2001; Og ug bue and Sawidis, 2013). With respect to the number and Synthetic Dyes find use in a wide range of industries but are of primary importance to textile manufacturing. Wastewater from the textile industry can contain a variety of polluting substances including dyes. The environmental and subsequent

health effects of dyes released in textile industry wastewater are becoming subject to scientific scrutiny. Environmental legislations are being imposed to control the release of dyes, in particular azo-based compounds, into the environment. Wastewater from the textile industry is a complex mixture of many polluting substances ranging from organochlorine-based pesticides to heavy metals associated with dyes and the dyeing process. During textile processing, inefficiencies in dyeing result in large amounts of the dyestuff being directly lost to the wastewater; which ultimately finds its way into the environment. Colorants that enter the wastewater streams normally pass through a wastewater treatment plant where they are eliminated to a large degree by adsorption on sludge. The extent to which residual amounts reach the surface waters depends on the efficiency of treatment processes. Low concentrations of dyes in waste water do not normally pose any significant environmental hazard. Environmental problems arise mainly from inefficient removal of dyes or disposing the untreated dye effluent to water receiving bodies. This is normally the case in most developing countries. Though stringent environmental legislations do exist in most of the countries, the will to implement these legislations faithfully is needed to overcome the human health and environmental hazards of synthetic dyes.

2. TYPES OF DYES:

2.1 Azo dyes:

Azo dyes are considered by the presence of one or more azo bonds (-N=N-), in association with one or more aromatic structures. They consider carrying high photolytic stability and resistance towards major oxidizing agents. They have an inclusive diversity of presentation in textile industries (Carliell, 1995; Chung and Stevens, 1993)

2.2 Anthraquinone dyes:

Anthraquinone dyes found the second most plentiful class of textile dyes, after ate dyes (Baughman and

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2. persist colored for long periods of time (Fontenat er al.. 2003

2.3 Metal complexes dyes:

Metal complexes dyes are amalgamations of a dyestuff and a metal (generally chrome). They were developed from the older mordant dyes and are very light-and wash-fast, metal-based complex dyes, such as chromium-based dyes, their use could lead to the discharge of chromium, which is carcinogenic in nature, into water supplies (Banat et al, 1996)

2.4 Direct dyes:

Direct dyes are used in the dyeing of cotton, rayon and nylon. They are anionic dyes, generally, the dyes in this class are poly azo compounds, along with soxne stilbenes, phthalocyanines, and crazines (Hunger, 2003).

2.5 Basic dyes:

Basic dyes are used for polyacrylonitrile, modified nylons, modified polyesters, cation dyeable, and polyethylene terephthalate. These dyes produce colored cations in solution and that is why they are called cationic dyes. The principal chemical classes are diuzahemicyanine, triarylmethane, cyanine, hemicyanine, thiazine, oxazine and acridine (Hunger, 2003: Christie. 2007)

2.6 Reactive dyes:

Reactive dyes are soluble in water that need moderately simple dyeing methods they are generally used fur dyeing cellulosic fibers, such as cotton and rayon (Yang et al., 20015)

2.7 Sulfur dyes:

Sulfur dyes have transitional structures and though they form a moderately small group of dyes, the low charge and good wash fastness goods make this class important from a commercial point of view.

2.8 Vat dyes:

Vat dyes are extremely fast dyes used for cotton mainly te dye cellulosic fibers as soluble salts and for rayon and wool toe. These dyes are with a principal chemical class containing anthraquinone (including polycyclic quinones and indignids) (Christie, 2007),

3. TOXICITY OF TEXTILE EFFLUENTS:

The textile dyeing industries produce a huge amount of effluents, dirt slurry and solid waste ingredients every day. In textile dyeing effluents, heavy metals such as iron, lead, nickel, copper, zinc, and chromium are present in trace amounts. The synthetic azo dyes are carcinogenic and toxic posturing a severe health risk to human health. These dyeing effluents are being quitted into the adjacent waterway, farming fields, irrigation channels, exterior water and these lastly arrive into the water bodies like river, sea, etc. Textile and dye industrial effluents may cause variation of the physical, chemical, and biological nature of aquatic atmosphere by the nonstop alteration in turbidity, odor, noise, temperature, pH, etc. that is injurious to community health, livestock, wildlife, fish and biodiversity. The presence of dyes in surface and subsurface water is making them not only appealingly intolerable but also sources many water-borne diseases, viz. mucous membrane, dermatitis, perforation of the nasal septum and severe irritation of respiratory tract. Adulteration to this aquatic system carries severe hazard to the inclusive epidemic and socio-economic outline inside (Islam et al., 2011).

4. POLLUTIONS OF TEXTILE DYEING EFFLUENTS:

Textile printing and dyeing processes include pre-treatment, dyeing, printing and finishing. These processes produce huge amounts of effluents containing starch, waves, Carboxyl Methyl Cellulose (CMC), polyvinyl all, wetting agents, sodium hypochlorite, Cl. NaOH, H_2O, acids, surfactants. NaSiO,, sodium phosphate and short cotton fiber. The potential specific pollutions come cut from the textile printing and dyeing processes. The pollutants are dissolved solids (DS) of starch, strongly colored, high BOD,, DS, low SS, heavy metals, oily and slightly alkaline (Ghaly er al. 2014).

5. CONCLUSION:

The textile and dyeing industry is one of the major industries in the world. It offers employment and plays a foremost responsibility in the economy of many countries like Bangladesh, India, Pakistan, and Sri Lanka. A wide variety of synthetic dyes like azo dye, vat, reactive dye, disperse dye, etc. widely used in the textile sector. The textile dyeing industries produce large amounts of effluents, dirt slurry and solid waste ingredients every day. A complex mixture of dangerous chemicals both organic and inorganic discharges into aquatic bodies from all textile industries .The study observed that the toxic textile dyeing effluents are needed to treat before discharging into water bodies to reduce pollution.

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