

Load of Industrial Waste and Its Effect on the Kanpur City

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Abstract - The increased population has led to an increase in the demand for goods which results in rapid industrialization. Demands for goods are directly proportional to the number of industries. In turn, the increase in industrial set-ups has led to the increased production of industrial wastes. These industrial wastes cause major environmental havoc by polluting the water air and soil. In this paper we will discuss about the load of industrial waste and its effect on the Kanpur city by disposal of pollutants. As we know Kanpur city has nearly 800 industries. The city of the Kanpur in the north Indian state Uttar Pradesh is famed for its leather industry, meeting national and international demands for superior quality leather. The industry, which employes thousands and earns a lot of revenue however, has a notorious side to it. It is a source of hazardous Pollution that environmentalists say, is gradually killing the city. Each day, the tanneries pump out about 30 Crore litres of polluted water into adjucent, Ganges river. While city's water treatment unit has a capacity of treating 17 crore litres per day, Kanpur also generates 400 tones of solid waste water pollution through the discharge of industrial effluents is causing severe problems. The pollutants include As, Cr, Cd, Cu, Fe, Hg, Pb and Zn which are considered as toxicants. This research article presents a review on the toxicity of chromium and its health hazards on living organism based on the previous research is done.

Keywords: Population hazardous, tanneries, discharge, toxicity, havoc.

I. Introduction

The increased population has led to an increase in the demand for goods which in turn has caused rapid industrialization. In turn, the increase in industrial set-ups has led to the increased production of industrial wastes. These industrial wastes cause major environmental havoc by polluting the environment. There are two types of wastes non-biodegrade waste such as heavy metals, pesticides plastic etc. and biodegradable compounds such as paper, leather, wool etc. Industrial waste water can be toxic, reactive carcinogenic or igni table ⁽¹⁾. Polluted water can be defined as water that contains excessive hazardous contaminants that make it

unsuitable for drinking, cooking, bathing and other uses⁽²⁾. Water pollution generally results from human activity and the pollutants released mostly come from industrial dumps, sewage leakage, oil spillages, heavy metals animal wastes littering fertilizers, herbicides and pesticides etc. These sectors consume around one third of renewable fresh water that is available and the pollutants released by them contain various synthetic and natural chemical contaminants ⁽³⁾. Industrial waste may pollute the nearby soil or adjacent water bodies and can contaminate ground water, lakes, streams, rivers or coastal waters⁽⁴⁾ Industrial waste is often mixed into municipal waste, making accurate assessments difficult. An estimate for the US goes as high as 7.6 billion tons of industrial waste produced annually, as of 2017⁽⁵⁾. The city Kanpur (U.P.) is famous for leather goods in all over the world. Leather industry process follows 4 main operations with subsequent processing steps within each in total there are 14 to 15 operational^(6,7). Each process generates contaminates that when discharged produce air, solid and water pollutions⁽⁸⁾ Air pollution causes issues not only for the surrounding areas but workers within the facilities due to debris and hars chemicals^(8,9). Pollutants include H₂S (Hydrogen sulphide), SO₂ (Sulphur dioxide), NH₃ (Ammonia) and VOC (Volatile organic compound)⁽¹⁰⁾. Solid Pollution comes from chemicals in effluent that has leached into surrounding soils from improper disposal. Trivalent chromium (Cr³⁺), and hexavalent Cr (Cr⁶⁺) is main chemical component are discharge from the tannery waste. The formation of Cr⁶⁺ from Cr³⁺ can cause "Severe allergic contact dermatitis" and pollute ground waters after leaching into soils ^(11,12). 80 to 85% of leather uses trivalent chromium due to its time and monetary advantages ⁽¹³⁾. Water pollution comes from the abuse of water without further treatment prior to large quantities of chemically infused effluent being discharged from tanneries to surface Water ⁽¹⁴⁾.

II. Problem at Kanpur Region

Kanpur is the ninth-largest city in India and one of its most severely polluted. Its eastern districts having about 380 industrial leather tanneries, many of which discharge untreated waste into local ground water sources and river Ganga. These pollutants include toxic levels of heavy metal contaminants. Chromium is popular in the tanning industry because it makes

leather goods stronger. The hexavalent chromium in tanning waste is known to cause cancer, liver failure, kidney damage, and premature dementia.

Noraiakheda is a settlement of 30,000 people with in Kanpur that has developed on top of a plume of chromium (VI), which is emitted in toxic sludge from an old chemical plant that has supported the region's tanneries. The sludge is a source of pollution and a danger to human health. Flammable methane trapped inside the sludge catches fire during the hot summer months, thus releasing harmful toxins into the air. Summer heat and winds also distribute dust particles from the sludge leaks into the river sub soil and ground water, the primary sources of drinking water around the surrounding community. A 1997 study conducted by the central pollution control Board on the ground water quality in Kanpur revealed chromium VI concentrations of 6.2 mg/l the Indian government places, the maximum tolerance limit for public consumption at 0.05 mg/l⁽¹⁵⁾. A case study reported Khan Chandpur (U.P.) Kanpur Dehat and their surrounding villages is Contaminated with a carcinogenic heavy metal and 45,000 tonnes of toxic waste dumped nearby. They complained that colour of the water in their village as peela (Yellow). Hand Pumps here have been spewing neon green water for years. Chromium occurs in nature in two stable forms. Trivalent chromium (Cr III) is an essential nutrient for the human body while Hexavalent chromium (Cr VI) is a carcinogenic. The hazardous waste dump near khan chandpur came from chrome sulphate manufacturing industries. Chrome sulphate is used as a tanning agent for leather and is not toxic in itself but improperly treated waste from these industries leads to the formation of Cr VI.

III. Toxicity of Chromium

Health Effects: Adverse health effects associated with Cr(VI) exposure include occupational asthma, eye irritation and damage, perforated eardrums, respiratory irritation, kidney damage, pulmonary congestion and edema, upper abdominal pain, nose irritation and damage, respiratory cancer, Skin irritation, and erosion and discoloration of the teeth. Some workers can also develop an allergic skin reaction called allergic contact dermatitis⁽¹⁷⁾. This occurs from handling liquids of solids containing Cr(VI) such as Portland cement. Allergic contact dermatitis is long lasting and more severe with repeated skin exposure. Furthermore, contact with non-intact skin can lead to ulceration of the skin sometimes referred to as chrome ulcers. Chrome ulcers are crusted, painless lesions showing a pitted ulcer covered with fluid.⁽¹⁸⁾

Cancer: All hexavalent chromium compounds are considered carcinogenic to workers. The risk of developing lung, nasal, and sinus cancer increases with the amount of hexavalent

chromium inhaled and the length of time the worker is exposed⁽¹⁹⁾.

Eye: Direct eye contact with chromic acid or chromate dusts can cause permanent eye damage. Avoid eye contact with dusts, fumes, smoke, liquids, mists and aerosols containing hexavalent chromium.

Respiratory Tract: Hexavalent chromium can irritate the nose, throat, and lungs. Repeated or prolonged exposure can damage the mucous membranes of the nasal passages and result in ulcers. In severe cases, exposure causes perforation of the septum. Some employees become allergic to hexavalent chromium so that inhaling the chromate compounds can cause asthma. The maximum amount of Cr (VI) which gets inhaled by air is 0.02 µg/m³.

Skin: Skin allergy Cr (vi) is an extremely sensitized agent workers who worked in Cr salt industries were exposed to Cr and they were reported to have contact dermatitis and it becomes a serious problem in industries. A very high proportion of population which comes in contact with Cr compounds shows a positive result of skin patches which becomes a serious issue⁽²¹⁾.

Toxicity: In Chromium contaminated sites not only human, animal and microbial life damage but the effects on plants are equally found. Due to chromium accumulation reduction in plant production along with toxicity in the nutritional contents are also observed^(22,23). Some plants show tolerance against chromium, but some have acquired the ability to accumulate chromium⁽²⁴⁾. The root and shoot growth rate and leaf chlorosis could be decided in hyacinth (*Eichornia crassipes*) by exposure to chromium and copper for several weeks⁽²⁵⁾. In *Triticum aestivum*, hexavalent chromium showed adverse effect on the growth parameters and also caused accumulation of chromium in plants⁽²⁶⁾.

IV. Impact of CETP Effluents on Crops and Ground Water Quality

The impact of waste water from sewage treatment plants (STPs) and common effluent treatment plant (CETP) in Jajmau, Kanpur on ground water, agriculture and environmental quality in the receiving areas around the villages of Jajmau having the extent of ground water pollution and distribution pattern of heavy metals on vegetables caused by effluent of STPs and CETPs. Ground water sampled data were collected and analysed for the physicochemical parameter and heavy metals mainly chromium, lead Arsenic along the analysed parameter showed that TDS, hardness and salt, chromium content were found high in ground water of Industrial area. The ground water of industrial area is not suitable for drinking because it contains high concentration of

TDS, Hardness, salt and chromium. The use of chemicals TDS such as sodium chloride, sodium Hardness sulphate, chromium sulphate etc. Salt during the tanning processes is the main source for the high concentration of major ions and chromium in ground water. on vegetable, the critical levels of heavy metal like Cr, Fe, Mn and Zn also found in high level concentration where effluent discharge is using for agricultural crop⁽²⁷⁾.

V. Conclusion

North Indian city Kanpur is famed for its tanneries are being choked by untreated effluents that are creating adverse effects to environment. It is a source of hazardous pollution that environmentalists say is gradually polluting the city.

The ground water in Khan Chandpur and surrounding villages is contained, with a carcinogenic heavy metal, due to dumped 45,000 tonnes of toxic waste damped nearby. Each day the tanneries pump out about 30 crore litres of polluted water into the adjacent Gangas river while city's water treatment unit, however, has a Capacity of treating 17 Crore liters per day. The rampant pollution has contaminated ground water sources. There are reports of increasing deformities among new born babies. Farmers complain their fields are turning toxic. The soil and ground water are contaminated with high level of chromium in Jajmau area, Uttar Pradesh, India. Fumes coming out of a factory in Jajmau area causing asthma, and polluted the air quality. A drain from the tanneries pours chromium contaminated untreated waste water creating havoc on the society cancer patients are increasing day by day. As we know hexavalent chromium is carcinogenic. We should have to adopt new technology, efficient training of employees for safe use and development of better technology for disposal of waste and being more conscientious about the use of raw materials can help control industrial pollution at the source. Recycling as much polluted. Water in the industries as possible by increased recycling efforts to reduce industrial pollution. Organic methods should be adopted to clean the water and soil. By developing and implementing adequate treatment facilities for handling industrial waste and proper habits can reduce pollution.

The environmental protection Agency (EPA) should be more stringent rules to take action against the companies who do not follow proper protocol. By these some habits we can control much more pollution and can safe our society.

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