Introduction:

Now a day’s environmental pollution is most of the major and important issue in all over world. So that India is not option for it because it’s a developing country and its population is also huge. Environmental pollution is categorized into the air and water pollution. From this water pollution is very concerning issue with respect to the living beings. Natural reservoirs of water like river, lake are fulfilling the basic needs of humans, plants and animals. Due to the growth of industrial area and modernization water resources are more and more polluted. And mostly water from natural water reservoirs (rivers, lakes, etc.) is used to full fill the daily needs of peoples and industries. Thus, water pollution directly related to different public issues among which health is most important. Water pollution takes place most major source is industrial effluent (dying processes), domestic sewage from rural areas, waste from the effluent treatment plant etc.

The large amount of waste is introduced into the natural resources of water which consist of phenolic compounds, dyes, carcinogenic and heavy metals, suspended matter, etc. all these pollutant are shows the adverse effect on water quality like taste, color, odor, P<sub>4</sub>, COD, BOD, DO etc. As well as some of the contaminants also show the toxic effect on humans, plants and living things in water bodies. Thereby, due to manmade pollution, water from reservoirs turn out to be non-potable (Ak De, 2003).

Water pollution is an appealing issue since it is directly related with public health. Wastewater pollution gives bad effects on public water supplies which can cause health problem such as diarrhea, allergic dermatitis, skin irritation, disfunction of kidney, reproductive system, liver, brain, central nervous system etc (Lorenc-Grabowska et. al, 2007 and Kadirvelu et al., 2003). The high concentration of dyes increases the BOD of receiving waters (Tunay et. al, 1996). Discharge of sewage into natural water bodies results into change in the characteristics of the natural water such as color, odor, pH, salinity, etc. Change in characteristic of natural water affect industrial water supplies, domestic water supplies, etc. such polluted water also affects real estate by causing damage to paints, damage to boat, damage to iron metal pipe lines, etc. Therefore treatment of these pollutions before their release into environment is extremely (Schrank et al., 2002).
Among different pollutants dyes shows major contribution to the water pollution. Because the annual production of dyes is estimated about $8 \times 10^7$ tonnes from which about 10% of it is discharged into the natural water bodies. Dyes or colorants are characterized by their ability to absorb visible light from 400 to 800 nm, due to this reason that they appear to be colored. Man has been using colorants since prehistoric times. The prehistoric man used dye to dying of furs, textile, leather and other objects with natural dyes, mainly vegetable and animal origin. Nowadays, very few dyes are made from the natural sources and most of them are synthetic in origin. It was the discovery of mauve by Perkin in 1865, which resulted into the start of the synthetic dye industries (Zollinger, 1987).

Colorants are either dyes or pigments. These two terms are often used arbitrarily; however, pigment may not be a single substance but can be a mixture of dyes. Ideal pigments are practically insoluble in the medium in which they are suspended. Pigment particles have to be attached to substrates by additional compounds, called as binder. Dyes, on the other hand, are applied to various substrates (textile materials, leather, paper and hair) from a solvent in which they are completely, or at least partly, soluble. In contrast to pigments, dyes must possess a specific affinity to the substrate on which they are to be applied (Zollinger, 1987).

The use of dyes in various industries results into formation of effluent containing invariable amount of dyes (Ganesh, et al., 1994 and Weber et al., 1995). The presence of color in effluent is continuing problem for the dyestuff manufactures dyers, finisher, water purification plants, etc. This resulted into increasingly stringent color consent standard are being enforced by regulatory bodies to reduce the quantity of color in effluent. Therefore, Department of Environment, Ministry of Natural Resources and Environment, India has established interim national water quality standards for India. For example the maximum contaminant level for color is 15 color units. The unit of measurement of color is the platinum in potassium chloroplatinate ($K_2PtCl_6$). One milligram per liter of Pt in $K_2PtCl_6$ is one unit of color (Sincero and Sincero, 2003). (Interim National Water Quality Standards for India, 2004).

Decolourisation of wastewater has become one of the major issues in wastewater pollution. This is because of many industries used dyes to color their products, such as textiles, rubber, paper, plastics, leather, cosmetics, food and mineral processing industries. Especially, the textile finishing industry has a specific water consumption (approx. 1L/kg of product), part of
which is due to dying and rinsing processes (Garg et al., 2004a). Of the current world production of dyestuffs (∼10 million kg/year) about 1 and 2 million kg of active dye enter the biosphere, either in dissolved or suspended form in water every year (Allen et al., 2003).

Some dyes are harmful to aquatic life where they are discharged. Dye in water can reduce light penetration into the water thereby decreasing the efficiency of photosynthesis of aquatic plants. This results into adverse impact on their growth (Yu et al., 2004). According to Kadirvelu et al. (2003) dyes also can cause severe damage to human beings, such as dysfunction of kidney, reproductive systems, liver, brain and central nervous system. The occupational exposure of the workers in the textile industry is linked to a higher bladder cancer risk. The use of hair coloring product and breast cancer has also been linked (Kadirvelu et al., 2003). Hence decolourisation of dye house effluent via the removal of dye has become an important aspect of textile wastewater treatment.

Although treatment is given to effluent, dyes are invariably left in the industrial wastes. Dyes have a synthetic origin and complex aromatic molecular structures, which make them inert and difficult to biodegrade when discharged into waste streams. (Ho and Chiang, 2004). The presence of very low concentrations of dyes in effluent is highly visible and undesirable. Furthermore, some dyes and their degradation products may be carcinogenic and toxic in nature (Oyama et al., 2004). Consequently dyes are important sources of water pollutions and their treatment become a major problem for waste water treatment. There number of methods reported which can be used for effluent containing dyes. However, many reported methods are not cost effective or not reliable at large scale.

Now a day’s waste water pollution is a major concern issue regarding environment. This waste water pollution mainly cause due to the industrial effluent and domestic sewage. In industrial effluent the dye industries has major participation in this regard. In dying processes dyes are discharged into the natural water bodies which are non-biodegradable in nature so causes harmful effect in different ways like reduce the light penetration into water, decreasing efficiency of photosynthesis in aquatic plant and causes to human beings, such as disfunction of kidney, reproductive system, liver, brain and central nervous system. Hence removal of a dye from natural or from industrial effluent has become an important aspect of wastewater treatment. The aim of present work is to study the removal of Azo dyes from aqueous solution in batch as well as on pilot scale method. In this aspect we are going to study the treatment of azo dyes by different physico-chemical methods like, in this study we will go to removal of dye by Adsorption method in which using different adsorbate like activated charcoal and we expect that it will gives about 98% removal of dye from its aqueous solution. In next method we will optimized the degradation of dye by advanced oxidation processes like Fenton’s oxidation by using different catalyst like hydrogen peroxide in this method we expect that we degrade about 90% dye from its aqueous
solution. Similarly by using different metal catalyst and photocatalyst like ZnO, TiO$_2$ and CdS they degrade the dye about 75% from its aqueous solution. We will also carry out the degradation of dye by enzymatic biodegradation method from which we expect the about 80% degradation of dye from its aqueous solution. This research has several aims to achieve its desired output i.e. to control the environmental pollution by using cost effective methods which can be also applicable on pilot processes. My research is helpful for better health life of aquatic as well as human beings.