INTRODUCTION

The Homo sapiens, proudly known as Humans - - in the last one century have made tremendous growth and development of technology and at the industrial front. The fast growth of industries, of which many had and still continue releasing the generated waste products directly in the environment, whether terrestrial or in atmosphere without any treatment, since long has led to many ill and adverse effects to the life in particular and the mother earth in general.

There are a number of definitions of pollution in current usage. The recent dictionary of life science has defined pollution as “the presence in the environment of significant amounts of unnatural substances or abnormally high concentration of natural constituent at a level that causes undesirable effects,” such a definition is probably too broad to be useful.

Pollution is a serious problem ever since sewage and industrial effluents are disposed directly into water bodies and on land. It has increased with the growth of industries as well as population. The national water commission stated that “water, which is not of sufficiently high quality to be suitable for the use of people who wish to use it for all purpose in the present or in the future. Is referred as polluted water”.

In reality, the term water pollution refers to any type of aquatic contamination between two extremes (1) a highly enriched over productive biotic community such as a river or lake with adulterants from sewage or fertilizer(cultural eutrophication) or (2) a body of water poisoned by toxic chemicals which eliminate living organism or even exclude all forms of life. “Water pollution has impacted vast changes to the quality of our surface and subsoil water to such a degree that its suitability either for human consumption or for the support of man’s natural life processes will decrease or fully cease”.

Most of the wastes of civilization are drained in to streams, lakes and rivers, and ultimately into oceans. In many cases the waste is dumped into the same bodies of water from which drinking water is drawn. The effect of sewage, industrial waste, and
agricultural drainage on plant and animal life in close bodies of water is sometimes catastrophic.

A very interesting source of information about water pollution is that it affects aquatic life. Tens of millions of fishes are killed every year by a wide verity of different pollutions from different sources, municipal and industrial. There are many cases on record of the destruction of wild life by polluted waters. Mass killing of fishes was among the earliest and most dramatic result if indiscriminate pollution of water. The cases are too numerous to list. During the ten year period from 1990-1999, a total of 345 million fishes are reported killed in more than, 6200 cases of pollution. The contaminators, coming from diverse sources may vary from year to year.

Practically, the volume of water to the process water used is calculated as the volume of effluent. In addition to the process waters, large volume of cooling water are also discharged as waste bodies is also an effluent contributing in significant quantities to the bulk. These effluents contain a wide variety of materials of both organic and inorganic nature including toxic substances and are usually discharged with or without treatment into surface water such as streams, lakes or rivers, and then to oceans and on land. There are various types of pollutions, and heavy metal pollution is one of them. These waste products may have long range effects on public health via the food chain. Inland waters act as receiving bodies.

Toxic metals from lead acid battery manufacturing, paint manufacturing, viscose rayon manufacturing, electroplating works, copper pickling, galvanizing and rubber processing, are some of the major industries which discharge effluents containing considerable amounts of heavy metals. The term “heavy metal” is somewhat imprecise, it includes most metals with an atomic number greater than 20, but excludes alkali metals, alkaline earths, lanthanides and actinides. The primary metals considered to be toxic are lead, arsenic, copper, cadmium, mercury, nickel. Some agricultural and forestry products also add many toxic pollutants to fresh water. These additions may be indirect.

These metallic solutions are toxic and inhibit self-purification of rivers. In addition to it, aquatic plants and animals also get killed. If the industrial waste is
discharged into sewer, metals get precipitated and settle down. Contamination of rivers by toxic metals prevents further use of water for industrial and drinking purpose. Arsenic and lead particularly make water dangerous to drink. These toxic materials are reported to cause chromosome damage and thus create hindrance to the natural process of heredity. It is reported that heavy metal ions precipitates in the mucous secretion of the gills in fish. These precipitates occupies the inter lamellar space, leading to the decrease in the movement of the gill filament, thus partially or fully preventing respiration. Copper in about 2 parts per hundred million parts of water is fatal to sticklebacks. The lethal concentration of nickel, lead and zinc is about 1 ppm.

The present study has been focused and designed to determine the effects of copper in a fresh water edible fish, *Labeo rohita*. Copper has essentially been a beneficial element in human metabolism. A deficiency of copper gives rise to nutritional problems in infants. Copper imparts some undesirable taste to water and can be been detected in range from 1 to 5 ppm. Small amounts are not generally considered to be toxic, but very large doses may cause sickness, and in extreme cases may lead to liver damage. During the use of copper sulphate in a surface water supply for algal control, the levels have to be closely monitored and controlled. Copper in small amounts does not constitute a health hazard but imparts an undesirable taste to drinking water. Copper occurs in copper plating wastes, copper pickling liquors. Copper compounds are toxic to fish and other aquatic life and micro organisms.

The presence of copper in the plant and animal tissue was recognized more than 150 years ago. Long before it was recognized as an essential element in the diets of birds and mammals. Copper is required for all forms of aerobic life and most form of anaerobic life. In man, the biological function of copper is related to the enzymatic action of specific essential copper proteins. Lack of copper enzyme is considered a primary factor in cerebral degeneration, depigmentation, and arterial changes. But accidental ingestion of large amounts of copper salts from food or beverages contaminated by copper released from copper vessels or pipes can cause gastrointestinal disturbances, and inhalation of copper fumes can cause metal fume fever.
In last fifteen years, the coastal areas of South Gujarat and adjoining areas have been converted into a huge industrial belt with establishment of several complex industrial estates like Rayon factories, Textile processing factories, Paper mills, Fertilizers plants, Fluoride manufacturing factories, etc. The Estuaries leading to rivers namely Auranga, Kaveri, Mindhola and Vishwamitri have become partially or completely polluted.

Some forms of water pollution are very obvious: everyone has seen TV news footage of oil slicks filmed from helicopters flying overhead. But much other water pollutions are usually less obvious and much harder to detect than this. But how can one measure and check water pollution when it cannot be seen? How do we even know its presence?

There are two main ways of measuring the quality of water. One is to take samples of the water and measure the concentrations of different chemicals that it contains. If the chemicals are dangerous or the concentrations are too great, we can regard the water as polluted. Measurements like this are known as chemical indicators of water quality. Another way to measure water quality involves examining the fish, insects, and other invertebrates that the water will support. If many different types of creatures can live in a river, the quality is likely to be very good; if the river supports no fish life at all, the quality is obviously much poorer. Measurements like this are called biological indicators of water quality.

Water pollution can be defined in many ways. Usually, it means one or more substances that have built up in water to such an extent that they cause problems for animals or people. Oceans, lakes, rivers, and other inland waters can naturally clean up a certain amount of pollutants by dispersing hem harmlessly. If a cup of black ink is poured into a river, the ink would quickly disappear into the river's much larger volume of clean water. The ink would still be there in the river, but such a low concentration makes it unable to be seen or detected. At such low levels, the chemicals in the ink probably would not present any real problem. However, if gallons of ink are discharged into a river every few seconds through a pipe, the river would quickly turn black. The
chemicals in the ink could very quickly have an effect on the quality of the water. This, in turn, could affect the health of all the plants, animals, and humans whose lives depend on the river.