



## LITERATURE SURVEY ON POLLUTANTS DETECTED IN SEA WATER DURING REHABILITATION

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### ABSTRACT

Substances of foreign origin are called pollutants, plays a main part in alarming health hazards. The essentiality of Water is being used without considering the dreadful contaminants. Arsenic, the most

potential and dreadful element is always ignored whenever there is a need for purification of water for the purpose of drinking. Rehabilitation of any affected area in view of health issues is highly mandatory as per the international provisions of Environmental legislations. In this work, we have tried to identify the potential pollutants, their sources and contamination limits toward hazardous health effects.

**KEYWORDS:** Pollutants, Toxicants, Turbidity, Inorganic, Organic, Acidity and Alkalinity.

### 1. INTRODUCTION

Natural Water always mingles with many dissolved organic and inorganic matter due to its pathway through rock, soil and environment.

#### 1.1 Inorganic materials in natural water

Sea water contains higher salt level (35gm / liter) than that of Rain water that contains only traces of dissolved matter like oxidized forms of sulfur, Nitrogenous toxicants from fuel combustion and Vegetation.

### 1.2 Organic materials in water

Organic contaminants gets purified when it is passing through the ground water system. Main sources of organic pollutants are live organisms, decomposing matter, drainage, industrial pollution and atmospheric fall out.

### 1.3 Dissolved Organic substance

This is the source of Biological pollution such as proteins, Amino acids, Fats, Lignin, sugar, chlorophyll etc. These are drawn from natural and synthetic compounds (pesticides), decaying plants and animals.

### 1.4 Standards of water pollutants

Parameters describing natural water Quality involve many factors. Different territories have different standards and factors in deciding the natural water quality. European system uses about 64 factors while rules established by Polish require only 51 factors in deciding the natural water quality. The stringent rules as framed by Environmental Protection Agency (EPA 1995) do require around 120 factors.

### 1.5 Indication By Colour of water

Colour of water is the better indicator of toxic contents that is mostly due to stains from textile industrial waste. Apparent colour indicates dissolved particles in colloidal state and dissolved platinum (Potassium Hexa Chloroplatinum IV -  $K_2PtCl_6$ ) along with complex of Cobalt.

## 2. Various Techniques To Determine Pollutants In Water

### 2.1 Photometry

This is a technique of light measurement using principle of absorbance of light by liquid. The photo detector is placed on one side of the sample solution when a monochromatic light is passed through the other side. The light absorbed by sample is calculated based on Beer-Lambert's law. Appropriate wavelength filters are suggested based on colour of the sample. Based on the absorbance of light, the amount of ingredients can be determined.

### 2.2 Coagulation and sedimentation

By coagulation and sedimentation of pollutant particles using alum the levels of toxic ingredients can be determined by analytical methods of analysis on sediment.

### 2.3 Turbidity

Turbidity is the principle of measurement of scattered light by turbid solution to determine the quantity of elementary and complex contents in the sample. Turbidity in water is due to the suspending organic and inorganic particles, staining complexes of aluminum, manganese and iron, Zooplankton and tiny life forms like pathogenic bacteria and Clay particles. Acceptable turbidity of drinking water is from 20 to 50mg / dm<sup>3</sup>.

### 3. Sources of Pollutants In Water

The major sources of water polluting agents are listed below

#### 3.1 Suspended solids

Solid particles such as rust, plant fiber colloidal, dissolved particles and Algae are the main sources of solid suspensions that contaminate water.

#### 3.2 Dry residues

It is the leftovers after evaporating the water sample at 105 °C.

#### 3.3 Inorganic chemicals that affect only taste.

This is due to salt, Iron, Manganese, Zinc, Copper and other minerals. These contaminations affect only the taste but not the odor.

#### 3.4 Inorganic Chemical that affect both taste and odor

Hydrophilic Acids, Hydro Carbons, Carboxylic Acids, Peptides, Pesticides, Biological Decay Products & Petroleum Products are the sources for this type of contaminations.

#### 3.5 Organisms that influence both odor and taste

Algae, Fungi and Protozoan.

#### 3.6 Compounds are detectable at extremely low concentration

Compounds that are detectable at extremely low concentration are regarded as Non-harmful to life as they are within possible harmless limits to life. Chlordane, Dichlorobenzene, Trichloroethylene, Phenol, Chlorophenol, Hydrogen Cyanide and compounds of Sulphur with Hydrogen, Methylene found in extremely lower Concentrations are considered to be non-toxic.

Sulphur containing amino acids, Hydrogen Sulphide (H<sub>2</sub>S), Methylthiol and Dimethyl poly sulfide. H<sub>2</sub>S decomposition of Sulphide minerals.

### 3.7 Physicochemical Parameters

Acidic water is highly corrosive. PH ranges from 0 to14.

**Table 1: pH Value of different type of Water.**

Type of Water	Values in pH
Surface Water	6.5 – 8.0
Ground Water	5.5-7.5
Acid Rain	< 3.0
Drinking water	6.5 – 8.5

### 3.8 Temperature of surface water

Surface water's temperature depends on Water origin, Altitude, Climatic Zone, Season, Degree of riparian Coverage, Inflow of Industrial Power plants, Industrial Cooling and Municipal Sewage. Temperature plays a major role over aquatic lives, communities influence on growth and biological activity. In water almost doubles the speed of chemical and biological reactions occurring for every 10 degree increase of the temperature. And also leads to decrease in amount of biochemical Oxygen Demand (BOD) and dissolved oxygen (DO). Oxidation of Ammonia and nitrates III and V by Nitrification which leads to deficit of Oxygen in water when acceleration. Toxicity of Pesticides, heavy metals increases by high Temperature. Acceptable Surface water temperature in Poland is 22°C to 26°C for Organisms like fish.

### 3.9 Alkalinity

The capability of water to neutralize acids refers to Alkalinity. Basic species Bicarbonate, Carbonate, Hydroxide, Calcium Carbonate, Magnesium Carbonate ions are responsible for alkalinity in water. Ammonia and Conjugate bases of Phosphoric, Silicic, Boric and Organic Acids are minor contributors of alkalinity.

The main sources of alkalinity is usually from Carbonate rocks (lime stone), most probably CaCO<sub>3</sub> which causes the hardness of water. Sodium Carbonate and Potassium Carbonate contribute the softness. Economic test strips are available for determination of Alkalinity and pH value. Computer Aided Titrimeter (CAT) and the pH electrode provide sophisticated electromagnetic measurement. For Fish and Aquatic lives alkalinity hold important role. (The Best functions @ pH range of 6.0 to 9.0).

### 3.10 Acidity of natural water

The capacity of the water to neutralize hydroxide ions (OH<sup>-</sup>) refers to Acidity of natural water system. Presence of weak acids like, Fatty Acids, H<sub>2</sub>S, H<sub>2</sub>PO<sub>4</sub>, Proteins, and Acidic metal ions like Fe<sub>3</sub><sup>+</sup> are caused for acidity. It is mostly due to soil (Humic acids), H<sub>2</sub>SO<sub>4</sub> and HCl in water, Hydrated metal ions.

### 3.11 Ionic Conductivity

It is a measure of the ability of an aqueous solution that carries an electric current which depends mostly on its ionic ingredients (Anion or Cation). Ions that disturb the conductivity of water is due to the presence of Ca<sup>3+</sup>, Mg<sup>2+</sup>, Fe<sup>3+</sup>, Mn<sup>2+</sup>, Dissolved Oxygen (DO) and Biochemical Oxygen demand (BOD). It is a measure of the amount of oxygen consumed by Micro Beings when organic matter decomposition. BOD indicates poor water quality. The amount of oxygen required for degradation of the organic compounds of waste water which will introduce Potassium Permanganate, Potassium Dichromate, Mercury Sulphate, Mercuric Chloride, Carbon dioxide (in other forms as CaCO<sub>3</sub> is Chemical Oxygen Demand (COD). Above the maximum contamination level of Chlorine present in water in any form is toxic for aquatic lives. Ammonium Nitrate that benevolences in water as chloramines NH<sub>2</sub>Cl, NHCl<sub>2</sub> and NCl<sub>3</sub>. Oxidation of Iron II compounds Manganese II, Nitrates III, Sulphides and Sulphates (IV), forms of Aliphatic and Aromatic Chloro-derivatives are all caused by Chlorine In natural water, in the form of dissolved Hydrogen Sulphide and Sulphates (IV). Silica metal compounds are of Ca<sub>2</sub>SiO<sub>3</sub>, Na<sub>2</sub>SiO<sub>3</sub>, K<sub>2</sub>SiO<sub>3</sub>, Mg<sub>2</sub>SiO<sub>3</sub>, and Poly nuclear Silicate species such as Si<sub>4</sub>O<sub>6</sub> (OH) or Silicic acid H<sub>4</sub>SiO<sub>4</sub> are of silica in water sources. Cations establish in water system have utmost concentration in different mineral forms of CaCO<sub>3</sub>, CaSO<sub>4</sub>, Dolomite, CaMg(CO<sub>3</sub>), Mg (CO<sub>3</sub>)<sub>2</sub> and Calcite. Sodium Chloride (Na Cl), Sulphates (Na<sub>2</sub>SO<sub>4</sub>), Carbonic Acid (NaHCO<sub>3</sub>, Na<sub>2</sub>CO<sub>3</sub>) Salts and Nitrates (NaNO<sub>3</sub>) Potassium in waters are hydrolytic decomposition of magna rock (KAISi<sub>3</sub>O), Potassium Chloride, Salts of Carbonic Acid (KHCO<sub>3</sub>, K<sub>2</sub>CO<sub>3</sub>) and Nitrates(KNO<sub>3</sub>). Al ions Al<sub>3</sub><sup>+</sup> has a weaker solubility sources are from industrial sewage, Aluminum tanks and Water treatment with alum (Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>) for corrosion.

### 3.12 Microbiological Parameters

Pathogenic organisms including Bacteria, Viruses and Protozoa. Pollution, Coli bacteria count present in water in Faecal Coliforms in water has been befalling by all living things and human beings, raw manure. Chlorination kills these bacteria. Nitrates in water produce

gastric cancer or methemoglobinemia and blue baby syndrome. Pollution occurs also due to the usage of ammonia fertilizers. Ammonia is toxic for aquatic organisms. Main causes of Iron in water are destruction of ore, stalwarts and soil, Manure of metallurgical tinting, galvanizing plants, and erosion pipes etc. Huge amounts of Fe II and Fe III in water root turbidity, Yellowish colour and a hostile taste. Manganese ( $MnO_2 \cdot H_2O$ ), Phosphorus in forms of Anions of Orth phosphoric acid is the other sources of pollutants. Fluoride existing in minerals soils originates in usual water. Fluoride in intake water, leads to extensive fall of dental cracks and is Unsafe to bones and teeth. Dissolved in emulsified hydro carbons like Phenols are simply bio degradable materials, unless they are in Deliberations of poisonous for micro beings.

Acute Toxicological effects of phenol, effects principal nervy system and demise can occur within half an hour after acquaintance and may affect unadorned abdominal troubles, kidney failure, cardiovascular system failure, lung oedema. Surfactants like Synthetic detergent components both Hydro phobic and Hydro philic are harmful aquatic environment to fish, planktonand plants can have severe impact on the marine ecological unit and unfitting for anthropological intake. This can cause cancer, effects on irrigation and pull down of resistant affected by genetics. World Health Organization (WHO) tells that 35% of cancer-causing matters are plagiaristic from foodstuff and beverages and 30% are from smoking.

### 3.13 Heavy Metals

Low concentration of Arsenic in drinking water do have higher incidence of lung or bladder cancer. Cadmium is permissible by WHO. Chromium is permissible with acceptable concentration by WHO. Excess of lead may impact human health. Cyanide is a dreadful poisonous which exists as HCN in water and is used for Electro Plating and Metal cleaning in Chemical Industries. Selenium naturally occurs in earth's crust and is found in sedimentary rocks combined with Sulfide, Silver, Copper, Lead and Nickel in its Inorganic forms as Selenide, Selenate or in Organic form as volatile Methylated Selenium compounds (Dimethyl Selenide or Dimethyl dusekebude).

## 4 Radio Active Compounds

### Radio Activity is spontaneous

Emission Nuclear radiation of nuclide into another nuclide Natural radio activity is caused by  $^{226}Ra$ ,  $^{222}Ru$ ,  $^{239}U$ ,  $^{230}th$ ,  $^{210}Pb$ ,  $^{40}K$  and Isotopes from atmosphere  $^3H$  and  $^{14}C$  Acquired radio activity caused by water pollution with radioactive.

#### 4.1 Isotopes

90Sr, 89Sr, 90Y, 91Y, 131I, 132I, 137Cs, 141Cs, 144Ca, 32P.

#### 4.2 Sewage Radio Isotopes

137Cs, 131I, 90Sr, 85Zn, 60Co, 40K, 32P, 24Na and **Mercury**.

#### 4.3 Highly Toxic Isotopes

238U, 226Ra, 210Po, 210Pb, 90Sr, 90Y.

#### Persistent Organic Pollutants (POPs)

PAHs, PCBs (include 200 different compounds in water environment, 60 were determined).

#### Pesticides

Insecticides

Herbicides

Fungicides are three groups.

#### Di Oxins

It found in Industrial Sewage.

#### Key Water Facts

Aquatic species ceases every year due to increased toxic pollutants from river following into the bay. A study from 1983 to 1993 showed a reduction of aquatic species from 840% to 75%. About 85% of the total pollutants by the rivers are flowing into the bay. Rivers clutch 90% of the earthly source of contaminants and nutrients into the Bhai Bay. Since 1990 up to 2010 worsening of sea water quality both the extent of pollution and affected area increased continuously. In Singapore, recycling the unwanted used (polluted) water into purified drinking water as New Water. Assessment of waste water recycling in Kuwait and its blow on amount of pollutants released into the ocean that preserves sea water quality. In the past decade about 50% of pollutants discharge into sea water is controlled. By this year 2020, due to shortage of storage capacity for recycled waste water around 880 millions of people are short of access to pure water. Each and every year about 3.6 millions of people die due to illness originated through polluted water. Around 80 per cent of water borne casualties is in children. About 14 percent of this casualty is due to diarrhea. On an average about 65 billion People are at peril of arsenic toxicities in India, Bangladesh, and Nepal.

## 5. CONCLUSION

Earth is covered about 79% of water of which 94.2% is in oceans and only 4.13% in the ground. Arsenic was a cumulative poison claiming loss of life due to cancer, cardiac ailments and other symptoms. Research works claims that as small as 3 parts per billion (ppb) of arsenic is a dreadful weapon causing loss of life. Arsenite ( $\text{As}_3^+$ ) is the more toxic than Arsanate ( $\text{As}_5^+$ ). 6 kilometers is the typical distance Africans and Asians walk to carry water. 98 % of casualties arise due water borne ailments the world. Waste water reuse is restricted for agricultural applications. The Ministry of Public Works (MPW) is aiming at nil release of waste water into the sea. Ultimate aim in future development would be rehabilitation of polluted water and reuse of waste water project implementation in Tamil Nadu, India as like in Kuwait and Singapore.

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