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Water Quality Parameters 4 Treatment

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ABSTRACT-
Five elements mainly Earth, Water, Air, Fire and space constituted universe. A human body is made by these five elements. Today all of these sustaining elements is subjected to pollution by human being in the name of, Industrial Development, sewerage waste, and fertilizer of agriculture.
Drinking water is directly essential for human life. Therefore the water is subjected to analysis by Indian-Standard the physio-chemical and biological treatment of water is necessary. The water samples are subjected to analysis like odour, colour, pH, TDS, Hardness, Alkalinity and heavy metals. The present review paper describes about impotence of different parameters of water quality.
Keywords- pH, IS 10500/1991, TDS, alkalinity.

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I. INTRODUCTION

Water is substance of life cycle. The human body and other living organisms require it, but in its pure form any type of contamination but man disturbing water bodies viz, rivers, wells, strems, seas. On land the natural water system is being polluted by the addition of Industrial wastes, urban wastes, pesticides and related pollutant.

Water Quality Standards and Guidelines-

Standards and Guidelines are established to protect water for designated uses such as drinking, recreation, agricultural irrigation or protection and maintenance of aquatic life. Standards for drinking water quality ensure that public drinking water supplies are as safe as possible.

Who sets these standards and guidelines?
International- WHO, FAO
Country specific
India- CPCB, ICMR, BIS
USA-EPA

In India the design of water supply certain standards. Currently the standard being used is BIS 1172/1993 receffiremed in 1998.

Water Quality parameters

Water quality is determined by assessing three lasses of attributes: physical, chemical, and biological.

There are standards of water quality set for each of these classes of attributes.

Physical parameters of water Quality assessment
Colour
Odour
Turbidity
Temperature
Conductivity

Chemical parameters for water Quality assessment
pH
Acidity
Alkalinity
Hardness
Solids
Harmful Chemicals
Chlorides
Sulphates
Iron
Nitrates
Heavy Metals
Pesticides

Alkalinity
Capacity to neutralize acid
Presence of carbonates, Bi-carbonates and hydroxide compounds of ca, Mg, Na and K

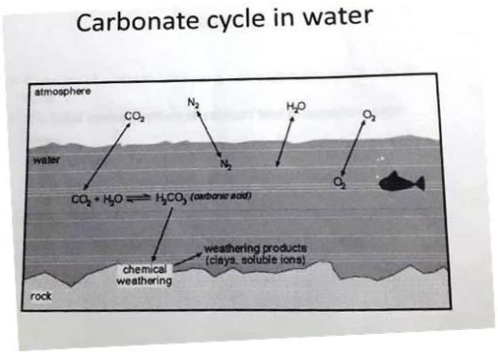
Alkalinity
• Alkalinity measures the buffering capacity of the water against changes in pH.
• Water that has a high alkalinity can accept large doses of acids or bases without altering the pH significantly.
• Waters with low alkalinity, such as rainwater or distilled water, can experience a drop in the pH with only a minor addition of an acid or base.
• In natural waters much of the alkalinity is provided by the carbonate/ bicarbonate buffering system.
• Alkalinity is determined by measuring the amount of acid needed to lower the pH in a water sample to

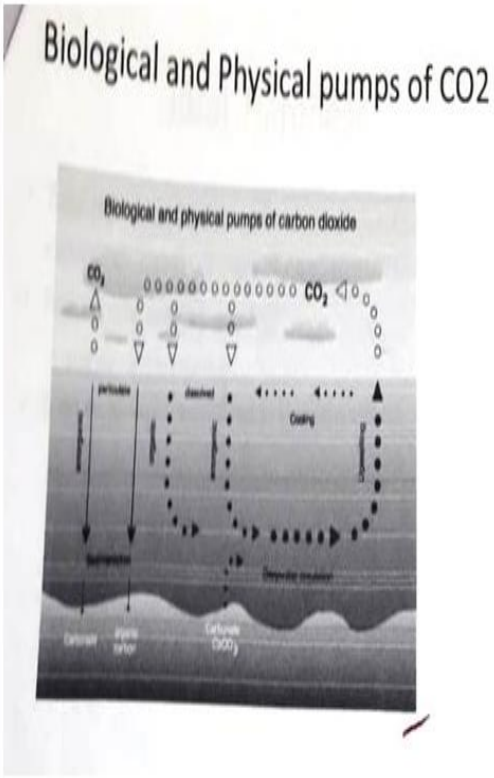
a specific endpoint; the results are usually reported in standardized units as milligrams CaCO3 per liter.

• Carbon dioxide dissolves in water to form carbonic acid , which dissociates and is in equilibrium with bicarbonate and carbonate ions.

CO_2 ⟷ (gas) CO_2 (dissc
CO_2(dissolved) + H_2O ⟷ H_2CO_3 ⟷ H^+
HCO_3 ⟷ $2H^+ + CO_3^{2-}$

• Buffering mechanism: If an acid is added to the water, the hydrogen ion concentration is increased, and this combines with both the carbonate and bicarbonate ions, driving the equilibrium to the left, releasing carbon dioxide into the atmosphere.





Parameters					
(IS 10500-1991)	Limits		Risk of effect	Source	Treatment
	Desirable	Permissible			
Colour (Hazen units)	5Hz	25Hz	Visible tint, acceptance decreases	Tannins, Iron, Copper, Manganese Natural Deposits	Filtration, Distillation, reverse osmosis, Ozonisation
Odour	Unobjectionable		Rotten egg, Musty, Chemical	Chlorine, Hydrogen sulfide, Organic matter, Septic Contamination, Methane gas	Activated carbon, Air stripping, oxidation, Filtration
pH	6.5-8.5	No relaxation	Low pH- corrosion, metallic taste High pH- bitter/soda taste, deposits	Natural	Increase pH by soda ash Decrease pH with white vinegar /citric acid

Total Dissolved Solids (TDS)	500mg/l	2000 mg/l	Hardness, Scaly deposits, sediments, cloudy colored water, staining, salty or bitter taste, corrosion of pipes and fittings	Livestock waste, septic system Landfills, nature of soil Hazardous waste landfills Dissolved minerals, iron and manganese	Reverse osmosis, Distillation, deionization by ion exchange
Hardness	300mg/l	600mg/l	Scale in utensils and hot water system, soap scums	Dissolved calcium and magnesium from soil and aquifer minerals containing limestone or dolomite	Water softener Ion Exchanger, Reverse Osmosis
Alkalinity	200 mg/l	600mg/l	Low	Pipes , landfills	Neutralizing
			Alkalinity(i.e. high acidity)causes deterioration of plumbing and increases the chance for many heavy metals in water are present in pipes, solder or plumbing fixtures.	Hazardous waste landfills	agent
Iron, Fe	03.mg/l	1.0mg/l	Brackish color, rusty sediment, bitter or metallic taste, brown-green stains, iron bacteria, discolored beverages	Leaching of cast iron pipes in water distribution systems Natural	Oxidizing Filter, Green-sand Mechanical Filter
Manganese, Mn	0.1mg/l	0.3mg/l	Brownish color, black stains on laundry and fixtures at 2 mgl, bitter taste, altered taste of water-mixed beverages	Landfills Deposits in rock and soil	Ion Exchange, Chlorination, Oxidizing Filter, Green-sand Mechanical Filter
Sulphate, SO_4	200 mg/l	400mg/l	Bitter, medicinal taste, scaly deposits, corrosion, laxative effects, "rotten- egg" odor from hydrogen sulfide gas formation	Animal sewage, septic system, sewage By-product of coal mining, industrial waste Natural deposits or salt	Ion Exchange, Distillation, Reverse Osmosis
Nitrate, No_3.	45 mg/l,	100mg/lit	Methemoglobinemia or blue baby disease in	Livestock facilities, septic systems, manure	Ion Excange, Distillation, reverse

			infants	lagoons, fertilizers household waste water, fertilizers fertilizers Natural Deposits	Osmosis
Chloride, CL	250mg/l	1000 mg/l	High blood pressure, salty taste, corroded pipes, fixtures and appliances, blackening and pitting of stainless steel	Fertilizers Industiral wastes Minerals, seawater	Reverse Osmosis, distillation, Activated carbon
Fluoride, f	1.0mg/l	1.5mg/l	Brownish discoloration of teeth, bone damage	Industrial waste geological	Activated alumina, distillation, reverse osmosis, Ion exchange
Arsenic, As	0.05mg/l	No relaxation	Weight loss; Depression; Lack of energy; Skin and nervous system toxicity	Previously used in pesticides (orchards) improper waste disposal or product storage of glass or electronics, mining Rocks	Activate alumina filtration, Reverse Osmosis, Distillation, Chemical Precipitation, Ion exchange, lime softening
Chromium, Cr	0.05mg/l	No relaxation	Skin irritation, skin and nasal ulcers, lung rumors, gastrointestinal effects, damage to the nervous system and	Septic systems industrial discharge, mining sites Geological	Ion Exchange, Reverse Osmosis, Distillation
			circulatory system, accumulates in the spleen, bones, kidney and liver		
Copper, cu	0.05mg/l	1.5 mg/l	Anemia, digestive disturbances, liver and kidney damage, gastrointestinal irritations, bitter or metallic taste; Blue-green stains on plumbing fixtures	Leaching from coper water pipes and tubing, algao treatment Industrial and mining waste, wood preservatives Natural deposits	Ion Exchange, Reverse Osmosis, Distillation
Cyanide	0.05mg/l	No relaxation	Thyroid, nervous system damage	Fertilizer Electronics, Steel, plastics mining	Ion Exchange, Reverse Osmosis, Chlorination
Lead, pb	0.05mg/l	No relaxation	Reduces mental capacity (Mental retardation), Interference with kidney and neurological function, hearing loss, blood disorders, hypertension, death at high levels	Paint, diesel fuel combustion pipes and solder, discarded batteries, paint, leaded gasonline Natural deposits	Ion Exchange, Activated Carbon, reverse Osmosis, Distillation

Mercury, Hg	.001mg/l	No relaxation	Loss of vision and hearing, intellectual deterioration, kidney and nervous system	Fungicides batteries, fungicides Mining, Electrical Equipment,	Reverse osmosis, distillation
			disorders, death at high levels	plant paper and vinyl chloride Natual deposits	
Zinc, Zn	5mg/l	15mg/l	Metallic taste	Leaching of galvanized pipes and ffittings, plants, dyes Natural deposits	Ion Exchange Water softeners, Reverse Osmosis, Distillation
Total Coliform Bacteria	95% of samples should not contain coliform in 100ml. 10 coliform/100ml		Gastrointestinal illness	Livestrock facilities, septic systems, Manure lagoons household waste water naturally occuring	Chlorination, Ultraviolet, Distillation, Lodination
E.coliform Bacteria	Nil/100 ml		Gastrointestinal illness	Livestrock facilities, septic systems, Manure lagoons household waste water naturally occuring	Chlorination, Ultraviolet, Distillation, Lodination

II. CONCLUSIONS

Sources of water pollution are all resulted from the disposal of chemical substances coming from medical, Industrial and house old waste, chaotic agriculture festilizers disposal and accidental oil spills that pollute the water to a large extent.

Higher health risk are the organo-metal compounds which may from when metals from water react with organic compounds from water. Common examples include HG, As and Cr poisoning of water. Thus if water is polluted with both metals and organic compounds the health risk is higher.

When various microorganisms (er bacterial species and virus), Worms and algae occurring in a large number are the water pollution causes.

Hence the treatments of ground or river water is essential for aquatic life.

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