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Physico-chemical parameters for testing of water – A review

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ABSTRACT

Individual's on lobe are under gigantic danger because of undesired changes in the physical, synthetic and organic qualities of air, water and soil. Because of expanded human populace, industrialization, utilization of composts and man-made movement water is profoundly dirtied with various destructive toxins. Regular water pollutes due to enduring of rocks and filtering of soils, mining handling and so on. It is important that the nature of drinking water ought to be checked at ordinary time stretch, on the grounds that because of purpose of polluted drinking water, human populace experiences shifted of water borne illnesses. The accessibility of good quality water is a fundamental component for forestalling illnesses and working on personal satisfaction. It is important to know insights concerning different physico-compound boundaries like tone, temperature, causticity, hardness, pH, sulfate, chloride, DO, BOD, COD, alkalinity utilized for testing of water quality. Weighty metals, for example, Pb, Cr, Fe, Hg and so on are of unique concern since they produce water or constant harming in sea-going creatures. Some water investigation reports with physic-synthetic boundaries have been given for the investigating boundary study. Rules of various physic-substance boundaries likewise have been given for contrasting the worth of genuine water test.

Keyword: *Water, Physico - synthetic, Boundaries, Hardness, Bod, Weighty metals.*

1. Introduction

Water is one of the most significant and plentiful mixtures of the biological system. All living creatures on the earth need water for their endurance and development. At this point just earth is the planet having around 70 % of water. In any case, because of expanded human populace, industrialization, utilization of composts in the horticulture and man-made movement it is exceptionally contaminated with various unsafe toxins. Hence it is essential that the nature of drinking water ought to be checked at standard time stretch, in light of the fact that because of purpose of sullied drinking water, human populace experiences fluctuated of water borne illnesses. It is challenging to comprehend the organic peculiarity completely in light of the fact that the science of water delights a lot of about the digestion

of the environment and make sense of the general hydro - natural relationship (Basavaraja Simpi et al. 2011).The accessibility of good quality water is a crucial component for forestalling sicknesses and working on personal satisfaction. Regular water contains various kinds of debasements are acquainted in with oceanic framework by various ways, for example, enduring of rocks and filtering of soils, disintegration of spray particles from the climate and from a few human exercises, including mining, handling and the utilization of metal based materials (Ipinmoroti and Oshodi 1993, Adeyeye 1994, Asaolu 1997). The expanded utilization of metal-based manure in agrarian upheaval of the public authority could bring about proceeded with ascend in centralization of metal contaminations in new water supply because of the water run-off. Likewise faucal contamination of drinking water causes water conceived infection which has prompted the passing of millions of individuals. (Adefemi and Awokunmi, 2010).

Individuals on globe are under colossal danger because of undesired changes in the physical, substance and organic attributes of air, water and soil. These are connected with creature and plants lastly influencing on it (Misra and Dinesh 1991). Modern turn of events (Either new or existing industry development) brings about the age of modern effluents, and if untreated outcomes in water, residue and soil contamination (Fakayode and Onianwa 2002, Fakayode 2005).Having essentially extreme measures of weighty metals like Pb, Cr and Fe, as well as weighty metals from modern cycles are of exceptional concern since they produce water or constant harming in amphibian creatures (Ellis 1989). Elevated degrees of contaminations essentially natural matter in stream water cause an expansion in organic oxygen interest (Kulkarni 1997), substance oxygen interest, all out broke down solids, all out suspended solids and waste coli structure. They make water inadmissible for drinking, water system or some other use (Hari 1994).There are patterns in non-industrial nations to involve sewage gushing as manure has acquired a lot of significance as it is viewed as a wellspring of natural matter and plant supplements and fills in as great compost (Riordan 1983). Ranchers are mostly keen on broad advantages, as expanded farming creation, minimal expense water source, powerful method of emanating removal, wellspring of supplements, natural matter and so on, yet are not very much aware of its destructive impacts like weighty metal defilement of soils, yields and quality issues connected with wellbeing. Research has demonstrated that drawn out utilization of this sewage gushing for water system sullies soil and yields so much that it becomes harmful to plants and causes weakening of soil (Quinn 1978, Hemkes1980). This contains significant measure of possibly destructive substances including dissolvable salts and weighty metals like $Fe^{2}+$, $Cu^{2}+$, $Zn^{2}+$, $Mn_{2}+$, $Ni^{2}+$, $Pb^{2}+$. Increments of these weighty metals are unwanted. Plants can gather weighty metals in their tissues in focuses over the allowed levels which is considered to address a danger to the existence of people, and creatures benefiting from these yields and may prompt tainting of natural pecking order, as seen that dirt and plants contained numerous harmful metals, that got water system water blended in with modern gushing (Adnan Amin 2010).The nature of ground water relies upon different substance constituents and their fixation, which are generally gotten from the topographical information of the specific locale. Modern waste and the metropolitan strong waste have arisen as one of the main source of contamination of

surface and ground water. In many pieces of the country accessible water is delivered non-consumable on account of the presence of weighty metal in overabundance. The circumstance gets deteriorated throughout the mid year season because of water shortage and downpour water release. Defilement of water assets accessible for family and drinking purposes with weighty components, metal particles and hurtful microorganisms is one of the serious significant medical conditions. The new examination in Haryana (India) presumed that it is the high pace of investigation then its re-energizing, unseemly unloading of strong and fluid squanders, absence of severe authorization of regulation and free administration are the reason for crumbling of ground water quality (Guptaa 2009).The majority of the waterways in the metropolitan region of the non-industrial nations are the closures of effluents released from the ventures. African nations and Asian nations encountering quick modern development and this is making ecological protection a troublesome undertaking (Agarwal Animesh 2011). Ocean water contains huge number of follow metals in tiny fixation. This is a difficult framework for the insightful scientist because of the exceptionally low centralizations of numerous significant follow metals (Robertson 1968, Riley).

1. Physico- Chemical Parameters

It is exceptionally fundamental and essential to try things out before it is utilized for drinking, homegrown, farming or modern reason. Water should be tried with various physic-substance boundaries. Choice of boundaries for testing of water is exclusively relies on for what reason we going to utilize that water and what degree we want its quality and immaculateness. Water contents various sorts of drifting, broke up, suspended and microbiological as well as bacteriological pollutions. Some actual test ought to be performed for testing of its actual appearance, for example, temperature, variety, scent, pH, turbidity, TDS and so on, while compound tests ought to be perform for its Body, COD, broke down oxygen, alkalinity, hardness and different characters. For acquiring increasingly quality and immaculateness water, it ought to be tried for its follow metal, weighty metal items and natural for example pesticide buildup. Clearly drinking water ought to finish these whole assessments and it ought to content required measure of mineral level. Just in the created nations this large number of standards' are totally observed. Because of extremely low convergence of weighty metal and natural pesticide contaminations present in water it need profoundly modern scientific instruments and thoroughly prepared labor supply. Following different physic substance boundaries are tried consistently for observing nature of water.

1.1-Temperature

In a laid out framework the water temperature controls the pace of every compound response, and influences fish development, proliferation and resistance. Intense temperature changes can be deadly to fish.

1.2-pH

PH is most significant in deciding the destructive idea of water. Bring down the pH esteem higher is the destructive idea of water. pH was decidedly connected with electrical conductance and complete

alkalinity(Guptaa 2009). The diminished pace of photosynthetic action the osmosis of carbon dioxide and bicarbonates which are eventually answerable for expansion in pH, the low oxygen values harmonized with high temperature throughout the mid year month. Different elements achieve changes the pH of water. The higher pH values noticed recommends that carbon dioxide, carbonate-bicarbonate balance is impacted more because of progress in physico-synthetic condition (Karanth 1987).

1.3-EC (Electrical Conductivity)

Conductivity shows huge relationship with ten boundaries like temperature , pH esteem , alkalinity , absolute hardness , calcium , complete solids, all out disintegrated solids , substance oxygen interest , chloride and iron grouping of water. Navneet Kumar et al (2010) proposed that the underground drinking water nature of study region can be checked actually by controlling conductivity of water and this may likewise be applied to water quality administration of other review regions. It is estimated with the assistance of EC meter which estimates the opposition presented by the water between two platinized anodes. The instrument is normalized with known upsides of conductance saw with standard KCl arrangement.

1.4-Carbon Dioxide

Carbon dioxide is the final result of natural carbon corruption in practically all oceanic conditions and its variety is much of the time a proportion of net biological system metabolism(Smith 1997, 1993, Hopkinson 1985). In this manner, in amphibian biogeochemical studies, it is alluring tomeasure boundaries that characterize the carbon dioxide framework. CO^2 is additionally the main green house gas on The planet. Its transitions across the air-water or silt water connection point are among the main worries in worldwide change studies and are much of the time a proportion of the net environment creation/digestion of the sea-going framework.There are different promptly quantifiable boundaries of amphibian carbon dioxide framework: like pH (pC_O^2), absolute broke down inorganic carbon (DIC) and all out alkalinity (TA). Surface water pC_O^2 can be estimated by photometric strategy (DeGrandpre 1993, Wang, Z 2002) and DIC CO^2 is estimated by coulometer or by an infrared CO^2 analyzer (Dickson 1994). Complete Alkalinity not entirely set in stone by HCl titration of the water test to the CO2 equality point.(Gran 1952).

1.5-Alkalinity

It is Made basically out of carbonate (CO^{32}-) and bicarbonate (HCO^3-), alkalinity goes about as a stabilizer for pH. Alkalinity, pH and hardness influence the poisonousness of numerous substances in the water. Not set in stone by basic dil HCl titration in presence of phenolphthalein and methyl orange pointers. Alkalinity in kettle water basically results from the presence of hydroxyl and carbonate particles. Hydroxyl alkalinity (causticity) in kettle water is important to safeguard the heater against consumption. Too high a causticity leads to other working issues, for example, frothing. Unnecessarily high causticity levels can bring about a kind of harsh assault of the heater called "embrittlement".

1.6-Dissolved Oxygen

DO is one of the main boundary. Its relationship with water body gives immediate and backhanded data for example bacterial movement, photosynthesis, accessibility of supplements, delineation and so forth. (Premlata Vikal, 2009). In the advancement of summer, broke down oxygen diminished because of expansion in temperature and furthermore because of expanded microbial movement (Greenery 1972, Morrissette 1978, Sangu 1987, Kataria, 1996). The high Really do in summer is because of expansion in temperature and span of splendid daylight has impact on the % of solvent gases (O^2 and CO^2). During summer the long days and extraordinary daylight appear to speed up photosynthesis by phytoplankton, using CO2 and emitting oxygen. This potentially represents the more prominent characteristics of O2 recorded during summer (Krishnamurthy R, 1990). DO in example is estimated titrimetrically by Winkler's strategy following 5 days hatching at 293

K. The distinction in starting and last DO gives how much oxygen consumed by the microorganisms during this period. This strategy needs exceptional Body bottles which seal within climate from environmental oxygen.

1.7-Carbonate

At the point when the pH contacts 8.3, the presence of carbonates is demonstrated. It is estimated by titration with normalized hydrochloric corrosive involving phenolphthalein as marker. Beneath pH 8.3, the carbonates are changed over into identical measure of bicarbonates. The titration should likewise be possible pH metrically or potentiometrically.

1.8-Bicarbonate

It is additionally estimated by titration with normalized hydrochloric corrosive involving methyl orange as marker. Methyl orange becomes yellow underneath pH 4.0. At this pH, the carbonic corrosive breaks down to give carbon dioxide and water.

1.1-Biochemical Oxygen Interest (BOD)

Body is a proportion of natural material pollution in water, determined in mg/L. Body is how much broke down oxygen expected for the biochemical disintegration of natural mixtures and the oxidation of specific inorganic materials (e.g., iron, sulfites). Ordinarily the test for Body is led north of a five-day time frame (Milacron Showcasing Co.).

1.2-Chemical Oxygen Interest (COD)

COD is one more proportion of natural material tainting in water determined in mg/L. COD is how much broke up oxygen expected to cause compound oxidation of the natural material in water. Both Body and COD are key signs of the ecological strength of a surface water supply. They are normally utilized in squander water treatment yet seldom in everyday water treatment. (Milacron Showcasing Co.).

1.3-Sulphate

It is estimated by nephelometric strategy in which the convergence of turbidity is estimated against the known grouping of artificially pre-arranged sulfate arrangement. Barium chloride is utilized for creating turbidity because of barium sulfate and a combination of natural substance (Glycerol or Gum acetia) and sodium chloride is utilized to forestall the settling of turbidity.

1.4-Ammonia (Nitrogen)

It is estimated spectroscopically at 425 nm radiation by making a variety complex with Nessler's reagent. The states of response are basic and cause extreme obstruction from hardness in water.

1.5-Calcium

It is estimated by complexometric titration with standard arrangement of ETDA utilizing Patton's and Reeder's marker under the pH states of more than 12.0. These circumstances are accomplished by adding a decent volume of 4N Sodium Hydroxide. The volume of titre (EDTA arrangement) against the known volume of test gives the convergence of calcium in the example.

1.6-Magnesium

It is likewise estimated by complexometric titration with standard arrangement of EDTA utilizing Eriochrome dark T as pointer under the cradle states of pH 10.0. The support arrangement is produced using Ammonium Chloride and Ammonium Hydroxide. The arrangement opposes the pH varieties during titration.

1.7-Sodium

It is estimated with the assistance of fire photometer. The instrument is normalized with the known convergence of sodium particle (1 to 100 mg/liter). The examples having higher focus are appropriately weakened with refined water and the weakening variable is applied to the noticed qualities.

1.8-Potassium

It is additionally estimated with the assistance of fire photometer. The instrument is normalized with known centralization of potassium arrangement, in the scope of 1 mg to 5 mg/liter. The example having higher fixation is reasonably weakened with refined water and the weakening component is applied to the noticed qualities.

1.9-Chloride

It is estimated by titrating a known volume of test with normalized silver nitrate arrangement involving potassium chromate arrangement in water or eosin/fluorescein arrangement in liquor as pointer. The last marker is an adsorption pointer while the previous makes a red shaded compound with silver when the chlorides are hastened from arrangement.

1.10-Silicates and Phosphate

These are additionally estimated spectroscopically. Yellow tone is created from the activity of phosphates and silicates on molybdate particle under solid acidic circumstances. The force of variety is straightforwardly relative to the convergence of phosphate and silicates in the example. Phosphate

buildings are diminished by frail lessening specialists, for example, ascorbic corrosive or tartaric corrosive (potassium antimonyl tartarate) where as silica edifices require solid decreasing states of hydrazine or bisulphite. The shade of decreased complex is sky blue.The greater part of the physico-compound not entirely set in stone by standard techniques recommended by ASTM (2003) and APHA (1985), Trivedy and Objective (1986), Kodarkar (1992).

2.-Some physico chemical analysis study of polluted water sample in India

Physico substance boundary study is vital to find out about the nature of water and we can look at aftereffects of changed physico synthetic boundary values with standard qualities. Aftab Begum et al.(2005) examined different physico-synthetic boundaries and investigation of untreated manure gushing. His outcome uncovered that the boundaries like EC, TDS, TSS, Body, COD and alkali are high contrasted with admissible restrictions of CPCB (1995), and parasitic investigation showed the presence of 15 species confined on Malt Concentrate Agar (MEA) medium accordingly demonstrating the pollutional heap of the gushing. Dey Kallol et al.(2005) contemplated different physio-synthetic boundaries on the examples drawn from the stream Koel, Shankha and Brahmani. It was seen that weakening during stormy season diminishes the metal focus level to a significant degree. Anyway the improvement of these metals by bio-amplification and bioaccumulation in palatable parts delivered in water is acknowledged to create a wonderful outcome on the water of the stream Brahamani which is of profound public concern.Pawar Anusha et al.(2006) has concentrated on the drag well and dug well water tests from an exceptionally contaminated modern region - Nacharam. Test were gathered and broke down for physico-substance boundaries by taking on the standard techniques for assessment for water and waste water. The investigated tests got a high qualities, contrasted and drinking water norms. Poonkothai and Parvatham (2005) had been considered physico-compound and microbiological investigations of car wastewater in Nammakkal, Tamil Nadu, India demonstrated that the qualities for physico-substance boundaries were on the higher side of reasonable constraints of BIS. Microbiological concentrates on uncovered the presence of microorganisms at high fixation and these organic entities fills in as markers for toxins. Rokade and Ganeshwade (2005) showed high vacillations in the physico-synthetic boundaries demonstrating the force of contamination. The pH went from least of 6.6 to limit of 8.4, chlorides from 132.5 to 820.4mg/l,

hardness went from 74 to 281 mg/l, CO_2 from 2.1 to 5.09, Body from 4.437 to 112.432 mg/l, sulfates 0.192 to 5.12 mg/l, nitrates 0.5 to 1.012. The base pH worth of 6.3 mg/l was found during winter season and limit of 8.93 mg/l in summer. The pH shows general decay from upstream to downstream. CO_2 was found to greatest in summer arriving at up to 55.44 mg/l and decreased to at least 2.28 mg/l during blustery season. From the information gathered it tends to be presumed that the reverse relationship, which is known to exist among pH and CO_2 , isn't existing in the present investigation(Sawane 2006).Sharma Madhavi et al. (2005) concentrated on ground water nature of modern area of Kishangarh for different physicochemical boundaries occasionally without and after expansion of marble slurry in various extents. From the review obviously these boundaries increment with the expansion of marble slurry prompting disintegration of the general nature of the groundwater.

Singhal et al.(2005) concentrate on covers the treatment of mash and paper plant emanating by Phanerochaete chrysosporium and similar has been looked at two changed pH 5.5 and 8.5. At both the pH, variety, COD, lignin content and all out phenols of the gushing essentially declined after bioremediation. Nonetheless, more prominent decolourisation and decrease in COD, lignin content and absolute phenols were seen at pH 5.5. Chavan et al. (2005) was completed examination to concentrate on the different natural contaminations present in the Thane spring water. The river water shows high upsides of Body and COD alongside 15 phenolic compounds, cleansers, alcohols, ether and CH3) 2CO, which are hurtful to amphibian life. The beginning of this poisons is basically from the passage of effluents from encompassing industries.Two significant concrete businesses of the Ariyalur and Reddipalayam were chosen and the waste water released from these units were gathered and exposed to examination. The upsides of various boundaries were contrasted and the standard qualities given by Tamil Nadu Contamination Control Board. The purposes behind varieties are investigated and medicinal measures proposed (Gnana 2005). In mineral based industry among different natural issues the water contamination makes presented most appalling difference and complex difficulties for undertaking fundamental healing measures. The wellsprings of water contamination in various mineral based enterprises including mining, mineral handling, coordinated iron and steel plant and nonferrous metal ventures are depicted. Different fluid emanating medicines methods both physiochemical and natural have been depicted and talked about. The cycle for each situation being utilized economically, have been framed.(Jena and Mohanty 2005).Premlata Vikal (2009) has been work out the physico-compound qualities of the Pichhola lake water. He concentrated on different boundaries like air and water temperature, pH, free CO2, broke down oxygen, biochemical oxygen interest, substance oxygen interest, conductivity, complete disintegrated solids, hardness, absolute alkalinity, chloride, nitrate, phosphate and sulfate. The outcomes uncovered that the upsides of conductivity, COD, and sulfate were found to cross as far as possible in water tests. The coefficient of connection (r) among different physico-substance boundaries was additionally made.Gupta et al (2009) were examined water tests from 20 inspecting points of Kaithal for their physicochemical attributes. Investigation of tests for pH, Variety, Scent, Hardness, Chloride, Alkalinity, TDS and so on. On contrasting the outcomes against drinking water quality principles laid by Indian Gathering of Clinical Exploration (ICMR) and World Wellbeing Association (What its identity is), found that a portion of the water tests are non-consumable for person because of high grouping of either boundary. In this manner an endeavor has been made to find the nature of ground water in and around Kaithal City town, reasonable for the purpose of drinking or not. Basawaraj simpi et al.(2011) concentrated on month to month changes in different physic compound boundaries of Hosahalli water tank in shimoga area Karnataka. Studyshows that all boundaries are inside the cutoff and tank water non dirtied and it tends to be utilized for homegrown, water system and fishery reason.Saravanakumar and Ranjith Kumar (2011) presents paper concentrates about groundwater nature of Ambattur modern region in Chennai City. They concentrated on boundaries like pH, complete alkalinity, absolute hardness, turbidity, chloride, sulfate, fluoride, all out broke down solids and conductivity. It was seen that there was a slight variance in the physico-

synthetic boundaries among the water tests examined. Examination of the physico-synthetic boundaries of the water test with WHO and ICMR limits showed that the groundwater is exceptionally sullied and represent wellbeing dangers for human use. Manjare et al. (2010) were concentrates on the Physico-synthetic Boundaries of Tamadalge Water Tank in Kolhapur Area, Maharashtra. Month to month Changes In Physical and Compound Boundaries Like Water Temperature, Straightforwardness, Turbidity, Complete Disintegrated Solids, pH, Broke down Oxygen, Free Carbon dioxide, and Absolute Hardness, Chlorides, Alkalinity, Phosphate and Nitrates. Were examined for a times of one year. All Boundaries were inside as far as possible. The outcomes demonstrate that the tank is Non-contaminated and can be utilized for Homegrown and Water system.Exceptionally tainted water differently affects person, homegrown reason as well as modern use. For example, people get impacted/tainted because of presence of various microorganisms and weighty metals present in water. It might influence the different body organ and physiological problem. Hard water isn't appropriate for homegrown utilize like washing, washing, cooking as well as other reason. Hard water is likewise not reasonable for modern and farming use. It harms the sensitive hardware and influences the quality, soundness and polish of the end result.Focal water commission is keeping a three level Research center framework for investigation of the boundaries. The Level-I Research centers are situated at 258 field water quality checking stations on different streams of India where actual boundaries, for example, temperature, variety, scent, explicit conductivity, complete broke up solids, pH and Disintegrated Oxygen of waterway water are noticed . There are 24 Level-II Labs situated at chosen Division Workplaces to break down 25 different physico-substance qualities and bacteriological boundaries of stream water.

Table 1: Different analytical water quality parameters with their analytical technique andguideline values as per who and Indian standard

Sr. No.	**Parameter**	**Technique used**	**WHO standard**	**Indian Standard**	**EPA guidelines**
01	Temperature	Thermometer	-	-	-
02	Color	Visual / color kit	-	5 Hazen units	-
03	Odour	Physiological sense	Acceptable	Acceptable	-
04	Electrical conductivity	Conductivity meter / Water analysis kit	-	-	2500 us/cm
05	pH	pH meter	6.5 – 9.5	6.5 – 9.5	6.5 – 9.5
06	Dissolved oxygen	Redox titration	-	-	-
07	Total Hardness	Complexometric titration	200 ppm	300 ppm	< 200 ppm
08	Alkalinity	Acid – Base titration	-	200 ppm	-
09	Acidity	Acid – Base titration	-	-	-

10	Ammonia	UV Visible Spectrophotometer	0.3 ppm	0.5 ppm	0.5 ppm
11	Bi carbonate	Titration	-	-	-
12	Biochemical Oxygen Demand (B.O.D.)	Incubation followed by titration	6	30	5
13	Carbonate	Titration	-	-	-
14	ChemicalOxygen Demand (C.O.D.)	C.O.D. digester	10	-	40
15	Chloride	Argentometric titration	250 ppm	250 ppm	250 ppm
16	Magnesium	Complexometric titration	150 ppm	30 ppm	
17	Nitrate	UV Visible Spectrophotometer	45 ppm	45 ppm	50 mg/l
18	Nitrite	UV Visible Spectrophotometer	3 ppm	45 ppm	0.5 mg/l
19	Potassium	Flame Photometer	-	-	-
20	Sodium	Flame Photometer	200 ppm	180 ppm	200 ppm
21	Sulphate	Nephelometer / Turbidimeter	250 ppm	200 ppm	250 ppm

Table 2: Different analytical water quality parameters used for testing of quality of waterand their sourse of occurance and potential health effects with USEPA guidelines

Sr. No.	**Parameter**	**Source of occurrence**	**Potential health effect**
01	Turbidity	Soil runoff	Higher level of turbidity are associated with disease causing bacteria's.
02	Color	Due to presence of dissolved salts	-
03	Odor	Due to biological degradation.	Bad odor unpleasant
04	Electrical conductivity	Due to different dissolved solids.	Conductivity due to ionizable ions. High conductivity increases corrosive nature of water.
05	pH	pH is changed due to different dissolved gases and solids.	Affects mucous membrane; bitter taste; corrosion

06	Dissolvedoxygen	Presence due to dissolved oxygen.	D. O. corrode water lines, boilers and heat exchangers, at low level marine animals cannot survive.
07	Total Hardness	Presence of calcium (Ca2+) and magnesium (Mg2+) ions in a water supply. It is expressed. Hardness minerals exist to some degree in every water supply.	Poor lathering with soap; deterioration of the quality of clothes; scale forming
08	Total Alkalinity	Due to dissolved gases (CO_2)	Embrittlement of boiler steel. Boiled rice turns yellowish
09	TDS	Presence all dissolved salts	Undesirable taste; gastro-intestinal irritation; corrosion or incrustation
10	Calcium	Precipitate soaps, anionic	Interference in dyeing, textile,
11	Magnesium	surfactants, anionic emulsifiers,	paper industry etc.
12	Ammonia	Due to dissolved gases and degradation of organics	Corrosion of Cu and Zn alloys by formation of complex ions.
13	Barium	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits	Increase in blood pressure
14	Biochemical Oxygen Demand (B.O.D.)	Organic material contaminationin water	High BOD decreases level of dissolved oxygen.
15	Carbonate	Due to dissolution of CO2	Product imbalance Unsatisfactory productionShort product life
16	Chloride	Water additive used to control microbes, disinfect.	Eye/nose irritation; stomach discomfort. Increase corrosive character of water.
17	Nitrate	Runoff from fertilizer use; leaking from septic tanks,sewage; erosion of natural deposits	Effect on Infants below the age of six months Symptoms include shortness of breath and blue-baby syndrome.

18	Phosphate	-	stimulate microbial growth, Rancidity Mold growth
19	Sodium	Natural component of water	-
20	Sulphate	Due to dissolved Ca/Mg/Fe sulphates	Taste affected; gastro-intestinal irritation. Calcium sulphate scale.

References

1. Adefemi S. O. and E. E. Awokunmi, (2010), Determination of physico-chemical parameters and heavy metals in water samples from Itaogbolu area of Ondo-State, Nigeria, African Journal of Environmental Science and Technology, 4(3), pp 145-148.
2. Adeyeye EI, (1994), Determination of heavy metals in *Illisha Africana*, associated Water, Soil Sediments from some fish ponds, International Journal of Environmental Study, 45, pp 231-240.
3. Adnan, Amin, Taufeeq, Ahmad, Malik, Ehsanullah, Irfanullah, Muhammad, Masror, Khatak and Muhammad, Ayaz, Khan, (2010), Evaluation of industrial and city effluent quality using physicochemical and biological parameters, Electronic Journal of Environmental, Agricultural and Food Chemistry, 9(5), pp 931-939.
4. Aftab, Begum, S. Y, Noorjahan, C. M., Dawood, Sharif, S, (2005), Physico-chemical and fungal analysis of a fertilizer factory effluent, Nature Environment & Pollution Technology, 4(4), 529-531.
5. Agarwal, Animesh and Manish, Saxena, (2011), Assessment of pollution by Physicochemical Water Parameters Using Regression Analysis: A Case Study of Gagan River at Moradabad- India, Advances in Applied Science Research, 2(2), pp 185 -189.
6. APHA, (1985), Standard Methods For Examination of Water and Wastewater, 20th Edition, American Public Health Association, Washington D. C.
7. ASTM International, (2003), Annual Book of ASTM Standards, Water andEnvironmental Technology v. 11.01, West Conshohocken, Pennsylvania,pp 6-7.
8. Basavaraja, Simpi, S. M., Hiremath, K. N. S. Murthy, K. N. Chandrashekarappa, Anil N. Patel, E.T.Puttiah, (2011), Analysis of Water Quality Using Physico-Chemical Parameters Hosahalli Tank in Shimoga District, Karnataka, India, Global Journal of Science Frontier, Research, 1(3), pp 31-34.
9. Chavan, R. P., Lokhande, R. S., Rajput, S. I., (2005), Monitoring of organic pollutantsin Thane creek water, Nature Environment and Pollution Technology, 4(4), pp 633- 636.
10. DeGrandpre, M. D, 1993. Measurement of seawater *p*CO2 using a renewable-reagent fiber optic sensor with colorimetric detection, Analytical Chemistry, 65, pp 331-337.
11. Dey, Kallol, Mohapatra, S. C., Misra, Bidyabati, (2005), Assessment of water quality parameters of the river Brahmani at Rourkela, Journal of Industrial Pollution Control,21(2), 265-270.
12. Dickson, A. and Goyet, C, (1994), DOE Handbook of Methods for the Analysis of theVarious Parameters of the Carbon Dioxide System in Sea Water, Version 2.

13. Drinking Water Inspectorate, available at http//www.dwi.gov.uk, accessed duringSeptember 2012.
14. Ellis, K.V., (1989), Surface water pollution and its control" Macmillan press Ltd, Hound mill, Basingstoke, Hampshire RG 21 2xs and London, 3-18, pp 97,100,101 and 208.
15. Gnana Rani, D. F., Arunkumar, K., Sivakumar, S. R., (2005), Physio-chemicalanalysis of waste water from cement units, Journal of Industrial Pollution Control, 21(2), 337-340.
16. Gran, G., (1952), Determination of the equivalence point in potentiometric titrations. Part II. Analyst, 77,pp 661-671.
17. Gupta, D. P., Sunita and J. P. Saharan, (2009), Physiochemical Analysis of Ground Water of Selected Area of Kaithal City (Haryana) India, Researcher, 1(2), pp 1-5.
18. Hari, O. S., Nepal, M. S. Aryo, and N. Singh. (1994), Combined effect of waste of distillery and sugar mill on seed germination, seeding growth and biomass of okra. Journal of Environmental Biology, 3(15), pp 171-175.
19. Hemkes, O. J, Kemp, A, Van, B. L.W., (1980), Accumulation of heavy metals in the soil due to annual dressings of sewage sludge, New Zealand Journal of Agricultural Sciences. 28, 228-238.
20. Hopkinson, C.S, (1985), Shallow-water and pelagic metabolism: Evidence of heterotrophy in the near-shore Georgia Bight, Marine Biology, 87, pp 19.
21. Indian Standard Specification for Drinking Water; IS: 10500: 1992. (Reaffirmed1993)
22. Jena, P. K., Mohanty, M, (2005), Processing of liquid effluents of mineral processing industries, Intl Symposium Environ Manag Mining Metallurgical Industries, 11-14 , Bhubaneshwar, pp 193- 212.
23. Karanth, K. R, (1987), Groundwater Assessment Development and Management Tata McGraw Hill publishing company Ltd., New Delhi, pp 725-726..
24. Kataria, H. C., Quershi, H. A., Iqbal, S. A. and Shandilya, A. K, (1996),Assessmentof water quality of Kolar reservoir in Bhopal (M.P.). Pollution Research. 15(2), pp 191-193.
25. Kodarkar, M. S., (1992), Methodology for water analysis, physico-chemical, Biological and Microbiological Indian Association of Aquatic Biologists Hyderabad, Pub. 2 : pp. 50.
26. Krishnamurthy, R., (1990), Hydro-biological studies of Wohar reservoir Aurangabad (Maharashtra State) India, Journal of Environmental Biology, 11(3), 335-343.
27. Kulkarni, G. J., (1997), Water supply and sanitary engineering. 10th Ed. Farooq KitabsGhar. Karachi, 497.
28. Manjare, S. A., S. A. Vhanalakar and D. V. Muley, (2010), Analysis of water Quality using Physico-Chemical parameters Tamdalge Tank in Kolhapur District, Maharashtra, International Journal of Advanced Biotechnology and Research, 1(2), pp115-119.
29. Milacron Marketing Co., The Effects of water Impurities on Water-Based Metalworking fluids, Technical Report No. J/N 96/47.
30. Misra, S. G., Dinesh, D., (1991), Soil Pollution, Ashing Publishing House, New Delhi,India

31. Morrissette, D. G., and Mavinic, D. S., 1978. BOD Test Variables. Journal of Environment: Engg. Division, EP, 6, 1213-1222.

32. Moss, B., (1972), Studies on Gull Lake, Michigan II. Eutrophication evidence and prognosis, Fresh Water Biology, 2**,** pp 309-320.

33. National Primary Drinking water regulations, Drinking water contaminants US EPA.

34. Navneet, Kumar, D. K. Sinha, (2010), Drinking water quality management through correlation studies among various physicochemical parameters: A case study, International Journal of Environmental Sciences, 1(2), pp 253-259.

35. Pawar, Anusha, C., Nair, Jithender, Kumar, Jadhav, Naresh, Vasundhara, Devi, V., Pawar, Smita, C., (2006), Physico-chemical study of ground work samples from Nacharam Industrial area, Hyderabad, Andhra Pradesh, Journal of Aquatic Biology, 21(1), pp 118-120.

36. Poonkothai, M., Parvatham, R., 2005. Bio-physico and chemical assessment of automobile wastewater, Journal of Industrial Pollution Control, 21 (2), pp 377-380.

37. Premlata, Vikal, (2009), Multivariant analysis of drinking water quality parameters of lake Pichhola in Udaipur, India. Biological Forum, Biological Forum- An International Journal, 1(2), pp 97-102.

38. Quinn, B. F., Syers, J. K., (1978), Surface irrigation of pasture with treated sewage effluent, heavy metal content of sewage effluent, sludge, soil and pasture, New Zealand Journal of Agricultural Research. 21, pp 435-442.

39. Riley, J. P. and G. Skirrow, Eds., Chemical Oceanography, Academic Press, London and New York.

40. Riordan, O', E. G., Dodd, V. A., Tunney, H., Fleming, G. A, (1983), The chemical composition of sewage sludges, Ireland Journal of Agriculture Research, 25, 239-49.

41. Robertson, D. E, 1968. Role of contamination in trace element analysis of sea water. Analytical Chemistry, 40(7), pp 1067-1068.

42. Rokade, P. B., Ganeshwade, R. M., (2005), Impact of pollution on water quality of Salim Ali Lake at Aurangabad, Uttar Pradesh, Journal of Zoology, 25(2), pp 219-220.

43. Saravanakumar, K. and R. Ranjith, Kumar, (2011), Analysis of water quality parameters of groundwater near Ambattur industrial area, Tamil Nadu, India, Indian Journal of Science and Technology, 4(5), pp 1732-1736.

44. Sawane, A. P., Puranik, P. G., Bhate, A. M., (2006), Impact of industrial pollution on river Irai, district Chandrapur, with reference to fluctuation in CO2 and pH, Journal ofAquatic Biology, 21(1), pp 105-110.

45. Sharma, Madhvi, Ranga, M. M., Goswami, N. K., (2005), Study of groundwater quality of the marble industrial area of Kishangarh (Ajmer), Rajshthan, Nature Environmental and Pollution Technology, 4(3), pp 419-420.

46. Singhal, V., Kumar, A., Rai, J. P. N., (2005), Bioremediation of pulp and paper mill effluent with *Phanerochaete chrysosporium*, Journal of Environmental Research, 26(3), pp 525-529.

47. Smith, S.V. and Hollibaugh, J. T, (1993), Coastal metabolism and the oceanic organiccarbon balance,

Reviews of Geophysics, 31, pp 75-76.

48. Smith, S.V. and Hollibaugh, J. T, (1997), Annual cycle and interannual variability of ecosystem metabolism in a temperate climate embayment, Ecology/Ecological Monographs, 67, 509.
49. Trivedy, R. K., and Goel P. K., (1986), Chemical and biological methods for water pollution studies, Environmental Publication, Karad, Maharashtra.
50. United States Environmental Protection Agency, (2009), 816-F-09-004.
51. Wang, Z., Wang, Y. and Cai, W.-J. and Liu, S. Y, (2002), A long lathlength spectrophotometric *p*CO2 sensor using a gas-permeable liquid-core waveguide, Talanta, 57, pp 69-80.
52. WHO Geneva, (2008), Guidelines for drinking-water quality (electronic resource), 3rd edition incorporating 1st and 2nd addenda, Volume 1, Recommendations.
53. WHO guidelines for drinking water quality. 2nd edition. Recommendation. WorldHealth organization Geneva, 1, pp 30-113.