RESEARCH ARTICLE

INTERNATIONAL JOURNAL OF RECENT RESEARCH IN PHARMACY

IJRRP

PHYSICO-CHEMICAL PARAMETERS FOR TESTING OF WATER IN BAREILLY REGION

Sunny Patel[*1], Shikha Saxena[1], Rohit Kumar Bijauliya[2] and Sachin Shrivastava[1]

[1]Department of Biotechnology, Invertis University, Bareilly-243123 (Uttar Pradesh), India
[2]Department of Pharmacognosy, BIU College of Pharmacy, Bareilly International University, Bareilly-243006 (Uttar Pradesh), India

Received- 14/July/2020 **Revised-** 31/July/2020 **Accepted-** 20/August/2020 **Published-** 30/September/2020

ABSTRACT

A essential resource for human life is water. Water is highly contaminated with various pollutants because of population growth, advanced farming methods, industrialization, man-made activity. The availability of good quality water is an essential function for disease prevention and quality of life enhancement. The quality of drinking water should be reviewed at regular intervals, as the human population suffers varied of water borne diseases due to the use of polluted drinking water from. We know details about different physico-chemical parameters such as colour, MPN (Most Probable Number) test, H_2S Test, Acidity test, Chloride test, pH test, Alkalinity test used for testing of water quality.

KEYWORDS: Water, physico-chemical parameters, MPN (Most Probable Number) test, H_2S Test, Acidity test, Chloride test, pH test, Alkalinity test, diseases, availability, contaminants

Corresponding Author

Sunny Patel,
Research Scholar, Department of Biotechnology, Invertis University,
Bareilly-243123 (Uttar Pradesh), India

E-mail: patelsunny0111@gmail.com

Quick Response Code

INTRODUCTION

Water is one of the ecosystem's most significant and plentiful substances. The biological phenomenon is difficult to fully understand because water chemistry reveals a great deal about the ecosystem's metabolism and describes the general hydro-biological relationship. As almost 70 per cent of its surface water supplies and a rising percentage of its groundwater reserves are polluted by biological, toxic, organic and inorganic contaminants, water pollution is a serious problem in India [1].

Water is used for various purposes by different sectors of society: drinking, eliminating or diluting waste, manufacturing manufactured products, increasing food, manufacturing and using electricity, etc. As seen over 20 years ago in the pioneering work of White, Bradley, and White, the water needed for each of these activities varies with climatic conditions, lifestyle, culture, tradition, diet, technology, and resources [2]. The type of access to water alone is an important determinant in total water use.

MATERIALS AND METHODS

Study Area and Methodology

The study area is situated in the Uttar Pradesh state of India, in the centre of Bareilly. Biodiversity is rich in this region. There were four sampling stations chosen for the current analysis. Water samples were collected at an interval of 30 days from selected sampling stations and pH, electrical conductivity, dissolving oxygen were immediately analysed using standard equipment at the sampling sites.

The other parameters like MPN (Most Probable Number) test, H_2S Test, Acidity test, Chloride test, pH test, Alkalinity test, were analyzed in the laboratory as per the standard procedures of APHA (1995).

A) MPN (Most Probable Number) Test

In general, especially for domestic purposes, water is mainly used for drinking. A large variety of inorganic compounds require growth, repair, maintenance and reproduction for all living organisms [3]. Water is the most essential and one of the most abundant of these substances, and it is particularly vital for living organisms [4].

Water plays an important role in human life. Approximately 65% of rural Indians and 36% of urban Indians indicated that the World Health Organization (WHO) lacked access to safe drinking water [5]. Enteric pathogens, such as *Salmonellae, Vibrio* and dysentery-causing bacteria coliform community, contaminate water. In lakes and rivers, human faecal matter brought in sewage is also discarded. This raises water pollution. Therefore, the source of water has to be periodically tested for microbial contamination. Coliform bacteria are the most accurate markers of faecal pollution. The existence of streptococci, however, is clear evidence of faecal contamination[6].

Members of coliforms bacteria are *Escherichia, Enterobacter, Proteus, Klebsiella, Yersinia, Hafnia, Serratia. E. coli,* and *Enterobacter aerogenes* are most important found as commensals which are abundantly found in the intestinal tract of all humans and are regularly discharged in the feces. *E. coli* and *E. aerogenes* are definitely found in any material which is focally polluted. In the planet, we may assume that any substance with the indicator of these coliforms is ironically contaminated [7]. The majority of bacterial contaminants are eliminated or inactivated by normal water treatment procedures. Sedimentation, coagulation / flocculation, sedimentation, filtration, and disinfection include the handling of water in normal drinking water [8].

Chemicals Used

Drinking water sample from different sites, Cotton wool, 70% ethanol, sterilized tip of tap, MacConkey's broth, Durham's tube, eosin methylene blue (EMB) agar plate, MacConkey agar, EMB agar, blood agar, nutrient agar, xylose lysine deoxycholate agar, and lysine iron agar.

Procedure

A most probable number (MPN) test was used to detect the total coliforms in drinking water samples. MPN was determined by the Mackie and McCartney (1996) method. This test is performed sequentially in three stages: presumptive, confirmed and completed test.

Presumptive Coliform Test

Method of multiple tube fermentation: presumptive count coliform-multiple tube examination. The test is called presumptive since the reaction detected may often be attributable to the existence of certain other species and it is important to validate the hypothesis that the reaction is attributable to coliform species. Water Sample Presumptive Coliform Count Obtained from Various Sites. Typically, an estimation of the number of coliform species is produced by adding varying amounts of water (0.1-50 ml) to MacConkey's double strength broth and MacConkey 's single strength broth containing bromocresol blue sterilised in bottle / tubes containing Durham's tube (for gas production indication) [9].

Confirmed Test

Confirmed test done by transferring a loopful of culture from a positive tube from the presumptive test into a tube of brilliant green lactose bile broth (oxoid) with Durham tubes. The tubes were incubated at 37°C for 24-48 h for total coliforms and 44.5°C for 24-48 h for fecal coliform and observed for gas production [5].

Completed Test

In compliance with (WHO, 2012), completed research was carried out by streaking a loop of broth from a positive tube into an eosin methylene blue (EMB) agar plate for pure colonies. The plates were incubated for 24-48 h at 37 °C. Colonies formed on EMB agar, or MacConkey's agar, were further classified using culture characteristics, morphology, and biochemical testing as coliform faecal coliforms (E. coli). Colonies with green metallic sheen were gramme-stained for faecal coliforms, and the IMVIC test was performed to classify the colony as E. From coli. The most likely number (MPN) per 100 ml of water was calculated using the completed test [10].

Determination of coliform count the amount of positive test tubes containing acid (yellow colour) and the output of gas was compared with the McCrady Statistical Table and the MPN of coliform present in 100 ml of the sample was

therefore calculated. A loop of presumptive test cultures inoculated on MacConkey agar, EMB agar, blood agar, nutrient agar, xylose lysine deoxycholate agar, and lysine iron agar, are used for the confirmation test. The culture plate will be incubated at 37°C for 24 hours [11].

B) H_2S Test

Hydrogen sulphide is a major problem associated with organic waste-containing anaerobic stabilisation of sulphur and with a variety of production processes that produce it during activity. Faecal pollution is a significant cause of numerous waterborne infectious diseases in drinking water supplies, a global concern. However, since the beginning of the 20th century, coliform bacteria have been used worldwide as the main measure of water faecal pollution [12], these may not be adequate as sole indicator of recent faecal contamination in tropical water [9].

Instead of detecting lactose-fermenting enteric bacteria, in particular coliforms, other enteric organisms containing hydrogen sulphide (H2S) such as *Salmonella sp., Citrobacter sp., Proteus sp.,* certain strains of *Klebsiella sp.,* certain variants of *Escherichia coli* and certain species of anaerobic clostridia have been proposed to alleviate this problem for the detection of faecal contamination in water by water [13]. By adding L-cystine that provides sulphur for enhancement, the normal H2S test medium was modified [14].

Since Allen and Geldreich observed a strong association of coliform with H_2S producing bacteria in 1975 [15], the 'H_2S test' was considered suitable for water in tropical and subtropical areas. It was also found to be active in temperate regions as well [16]. As H_2S is an acutely toxic gas that could rapidly reach harmful or even lethal levels, a short-term exposure level (STEL) or a ceiling value is established in several countries.

Chemicals Used

Water samples, sterile glass bottles, fresh cultures of *S. typhimurium* and *C. freundii*, peptone, dipotassium hydrogen phosphate, ferric ammonium citrate, sodium thiosulphate, Teepol, L-cystine HCl, H_2S.

Procedure

A total of 90 water samples were collected aseptically in sterile glass bottles from 40 pipe supplies, 20 open wells, 15 hand pumps and 15 surface water bodies (river, streams and ponds) in Lucknow. Water samples were analyzed within 6h of collection. Sterile water samples with pure fresh cultures of *S. typhimurium* and *C. freundii* (5–10 organisms/100mL) were used separately for each incubation period as positive control.

The basic 'H_2S test' medium [13] containing 20g of peptone, 1.5g of dipotassium hydrogen phosphate, 0.75g of ferric ammonium citrate, 1.0 g of sodium thiosulphate and 1 mL of Teepol in 1liter distilled water was modified by adding 0.25 g/litre of L-cystine HCl.

The sterile glass bottles containing required amount of modified 'H_2S test' medium was inoculated with five sets of 100 mL of each sample and incubated at 20, 25, 30, 35 and 44 ◦C temperatures, simultaneously. The bottles were observed for the blackening of the content after 18, 24, 42, 48, 66 and 72 h.

C) Acidity Test

Therefore, the drinking water provided may contain some pharmaceuticals. In a few studies [17, 18], pharmaceuticals were found in drinking water in the nanogram per litre range. Therefore, drinking water should be free of certain anthropogenic compounds on the basis of precautionary principles [19]. Tight membrane processes (i.e., nanofiltration or reverse osmosis) are efficient in dealing with components with such properties [20, 21, 22]. MBRs can generally be operated with longer sludge retention time (SRT) than can processes in conventional WWTPs.

Longer SRTs that can be done by MBRs are likely to increase pharmaceutical removal. Clara et al., for instance, stated that the removal of diclofenac in MBRs could be improved by extending SRTs, whereas in a study by Joss et al., such improvement was not important [23, 24]. In general, two mechanisms, absorption and biodegradation, are responsible for removing pharmaceuticals in the treatment of biological waste water [25, 26]. This provides a greater overall understanding of the treatment technology and the elimination of the pharmaceuticals investigated.

Chemicals Used

Phenol, sodium thiosulfate, acetonitrile, methyl-tertbutyl ether, $NaHCO_3$, acetic anhydride, methyl t-butyl ether.

Procedure

8 g/L of $NaHCO_3$ were added to 250mL of each sample in a separating funnel and dissolved. Two 1-mL aliquots of acetic anhydride were added under vigorous shaking and allowed to react for 2 min.

Phenolic acetates were then recovered from aqueous samples by solid phase extraction using styrene-divinylbenzene copolymer beads (ENVIChrom P SPE Tubes by Supelco, USA).

Samples were then eluted with 5 mL methyl t-butyl ether and analysed by a GC/MSD mod. CP3800 gas chromatograph coupled with a mod. Saturn 2200 mass spectrometer detector, both by Varian Inc., USA. A sample volume of 1 µL was injected.

Operating conditions were 40°C hold 2 min; 250 °C at 10°C/min hold 10 min. Hot needle spitless injection at 250°C with 1 mL/min He (99.9% purity grade) as carrier gas; mass spectrum with electron impact source tuned with perfluorotributylamine (PFTBA); ion trap, transfer line and manifold temperatures 200°C, 80°C and 170°C, respectively. This method is not suitable for 2,4-dinitrophenol and 2-methyl-4,6-dinitro-phenol determination.

D) Chloride Test

Water is a crucial part of life, 67% of our bodies are water, and every human being is dispensable with access to sufficient water supply. It has been estimated that 1.2 billion individuals lack the term. Access in order to save drinking water sources. One of the largest inorganic anions or negative ions in saltwater and freshwater is chloride in the form of Cl- ions. It originates from the dissociation of salts such as sodium chloride or calcium chloride in water [27].

$$NaCl\ (s) \longrightarrow Na^+\ (aq) + Cl^-\ (aq)$$

$$CaCl_2\ (s) \longrightarrow Ca^+\ (aq) + 2Cl^-\ (aq)$$

These salts and their resultant chloride ions derive from saltwater intrusion into estuaries and industrial emissions from natural minerals. There are several potential sources of manmade salts that may lead to elevated readings of chloride. Used to salt paths, sodium chloride and chloride and calcium chloride lead to high chloride levels in waterways. Chlorinated drinking water and sodium chloride water softeners also raise the amount of chloride in a community's wastewater. The salty taste created by chloride in drinking water depends on the chloride ion concentration [28]. If the chloride originates from sodium chloride, water containing 250 mg / L of chloride can have a noticeable salty taste.

The recommended maximum chloride level in the U.S. 250 mg / L is drinking water. The salty taste produced by chloride concentrations is variable in potable water and depends on the chemical composition of the water. Sodium chloride and calcium chloride are the key tastes that salts contain in water. Chloride anions and related cations in water are the explanation for the salty taste. If the cat-ion present in the water is sodium, it can have a measurable salty taste in some water that has just 250 mg / L chloride. On the other side, even though the water has an exceptionally high concentration of chloride, such as 1000mg / L, a standard salty taste may be absent. This is because the predominant cation in the water is not sodium, although there could be either calcium or magnesium [29].

Chemicals Used

Burette and stand, 10 and 20 mL pipettes, 100 mL volumetric flask, 250 mL conical flasks, 10 mL and 100 mL measuring cylinders, Silver nitrate solution**,** dry $AgNO_3$, distilled water, K_2CrO_4. $KMnO_4$, glass vessels, conc. HNO_3.

Procedure

Filter the given water sample so as to remove any suspended material. Pipette out 50 ml of this filtered sample in large porcelain disc and add 3-4 drop of phenolphthalein indicator to it if pink colour just disappears. To the red coloured solution obtained after adding methyl orange indicator add N/50 sodium carbonate solution until the colour of the solution changes to orange.

Transfer the resultant solution in a 250 ml conical flask and add1 ml of potassium chromate indicator. Now add slowly standard N/50 silver nitrate solution from the burette with constant shaking. A white precipitate of silver chloride will be obtained. Continue the addition process slowly, a red colour will appear in the flask, which disappear on shaking. Now add silver nitrate solution drop by drop until a permanent reddish-brown colour is obtained.

E) pH Test

Diesel combustion results in the release into the air of many contaminants, such as CO, CO2, PM, SOx, NOx, unburned HC, and black smoke [30, 31]. These chemicals are detrimental to the atmosphere and human health. A recent study (European Environment Agency, 2016) found that up to 39 percent of NOx emissions were from road transport, 7 percent from non-road transport and 7 percent from manufacturing processes in the year 2014. Diesel machines such as vehicles and electricity generation plants had a major contribution in NOx emission among these three categories [32].

There are several ways of minimising the form and quantity of contaminants published. The use of oil combined with water to create an emulsion is one of these remedies. The water vapour reduces the combustion temperature by using water-emulsified gasoline, leading to a decrease in NOx and PM emissions [33]. Micro-explosions of water particles play a significant part in combustion efficiency during combustion. The micro-explosion would result in the atomization of particles and then, with cleaner pollutants, less fuel consumption. The emulsion oil usually consists of a particular quantity of water, diesel, surfactants, and sometimes antioxidants.

A surfactant (also referred to as an emulsifier or emulsifier) is used to boost the stability of the device by reducing the interfacial surface tension between the water and the diesel particles [34]. Several studies have documented the use of various forms of surfactants and varying ratios of water to produce stable diesel emulsion water [35]. A device consisting of a mixed surfactant (between 80 and 85) was used to investigate acrylamide as a surface-active agent between water and the Isopar fluid with Isopar fluid and water. The stability / water solubility of a system consisting of gasoline, water and sodium bis(2-ethylhexyl) sulfosuccinate (AOT) (AOT) was also investigated by Tween 85 at various concentrations [36].

Chemicals Used

Sorbitan monolaurate, Polyoxyethylene-sorbitan Trioleate.

Procedure

Two surfactants, polyoxyethylenesorbitan trioleate (between 85) and sorbitan monolaurate (between 20), were selected and tested to stabilise Large. Commercial diesel was measured between 85 and 20 at low percentages (1 percent w / w), moderate percentages (3 percent w / w) and high percentages (5 percent w / w) to assess the highest surfactant stability. The amount of water in the emulsion was set at 17.5% (w / w). The stability of the emulsion was visually tested and counted from the time of blending until the water separates from the diesel.

Effect of mixing time on emulsion stability. The emulsion agitation was performed using laboratory tube immersion blenders at 3000 rpm to pick the best mixing time for the most stable Large. Mixing time is an integral state of the process that can impact emulsion stability. Five samples with 30 percent (w / w) water and 5 percent (w / w) period 20 were prepared using commercial diesel at a total sample weight of 20 g. The samples were mixed at different durations of 1, 5, 10, 30, and 60 min.

Optimization of pH, water and surfactant percentages Using Design-Expert software (StatEase, v10), the effect of water percentage of surfactant percentage and pH value on water in diesel emulsion was studied using a central composite design (CCD) response surface method (RSM). The pH of water was regulated using the pH metre by balancing HCl and NaOH solutions (EUTECH, pH 2700). The vector input parameters were 5 percent-30 percent water (percent w / w), 1 percent-5 percent surfactant (percent w / w) and 5.5-7.5 pH. The stability of the emulsion was visually tested. The emulsion agitation was achieved at 3000 rpm using laboratory tube immersion blenders.

F) Alkalinity Test

90% of the water supplied to cities and towns in India is contaminated, according to the Central Pollution Control Board, of which only 1.6% is handled. The control of water quality is therefore central to human welfare [37, 38]. TDS is often monitored in order to create a water quality environment favourable for organism productivity. Free (CO_2) Carbon Dioxide naturally occurs in water in different quantities. In drinking water, the bulk of groundwater contains less than 50 ppm of carbon dioxide. An acidic water state is formed by a large amount of carbon dioxide in water. If carbon dioxide dissolves in water, it produces the following.

Water (H_2O) plus carbon dioxide (CO_2) yields carbonic acid (H_2CO_3). The dissociation of carbonic acid yields hydrogen (H^+) and bicarbonate alkalinity (HCO_3^-). The carbon dioxide in water pH value will drop as the concentration of carbon dioxide increases, and conversely will increase as the bicarbonate alkalinity content increases. Carbon dioxide in water equation is as follows.

$H_2O + CO_2 <====> H_2CO_3 <====> H^+ + HCO_3^-$

In water with a pH of 3.5 or less, carbon dioxide usually contains mineral acids, such as sulfuric acid or hydrochloric acid. In waters with pH values from 3.6 to 8.4, carbon dioxide will occur but will never be found in waters with a pH of 8.5 or higher. The pH value does not measure the amount of carbon dioxide in the water, but rather the carbon dioxide and bicarbonate alkalinity relationship. A very useful method for correlating various parameters has been found to be statistical regression analysis. Analysis of correlation tests the closeness of the relationship between independent and dependent variables selected. If the correlation coefficient is similar to +1 or -1, the likelihood of linear association between the variables x and y is seen. This way analysis attempts to establish the nature of the relationship between the variables and there by provides a mechanism for prediction or forecasting [39, 40, 41, 42].

Chemicals Used

Borate, silicate, ammonia, phosphate, $CaCO_3$, Na_2CO_3, phenolphthalein, pH meter, chlorine, chromate ion, carbonate, calcium, magnesium, dissolved carbon dioxide, alkalinity, chloride, copper and zinc.

Procedure

Total hardness was determined by taking 20 CC of drinking water and added 5 CC of buffer solution (NH_3 + NH_4Cl), and then 3-4 drops of Eriochrome black-T indicator and titrated with 0.01M EDTA solution. At the end point the solution changes from wine red to blue.

Now after adding starch solution, blue colour is obtained, the whole content is titrated again with the standard 0.01 M sodium thiosulphate solution till blue colour disappears. For estimation of chromate in drinking water, 20 CC of drinking water + 3-4ml sulphuric acid + 0.5gm sodium bi Carbonate + 2gm KI solution, are taken and this solution is titrated with 0.01 sodium thiosulphate solution, till yellow colour comes.

Now after adding starch solution (blue colour appears), the solution is titrated again with the sodium thiosulphate till blue colour disappears. For estimation of CO_3^{-2}, 20 ml of drinking water is taken in a conical flask, added 2-3 CC methyl orange indicator.

Titrated this solution with 0.01M HCl, the colour changes from yellow to red at the end point. For measuring total dissolved solids, gravimetric methods which is the most accurate and involve evaporating the liquid solvent and measuring the mass of residues left.

To determine the total alkalinity of drinking water, it is titrated with Standard N/50 H_2SO_4 solution in the presence of methyl orange indicator.

RESULTS

MPN (Most Probable Number) Test

A total 50 water sample were collected from different water cooler located at the different sites of the university. Out of 50 water sample, 22 (44%) were positive and 28 (56%) were negative from various sites of the university. Out of various positive water samples from various sites hospital, Medical college, Paramedical college, Girls and boys hostel, Nursing college, Physiotherapy college, College of education and stadium, dental college and dental outpatient department (OPD), college of computer science and information technology (CCSIT). Girls and boys hostel had the highest degree of bacterial contamination followed by Hospital, Medical college, Nursing college, College of education.

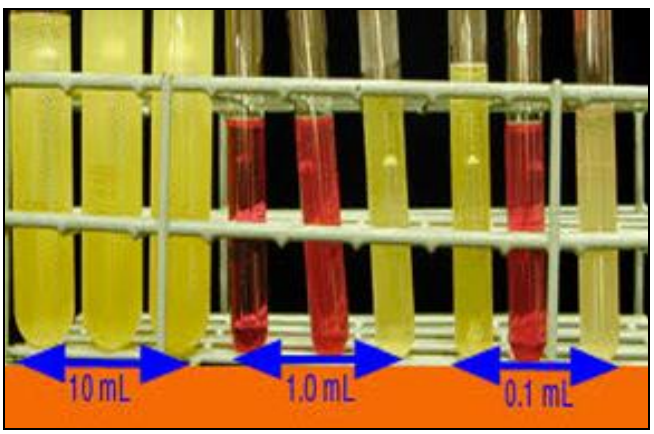

Figure 1: Presumptive Test

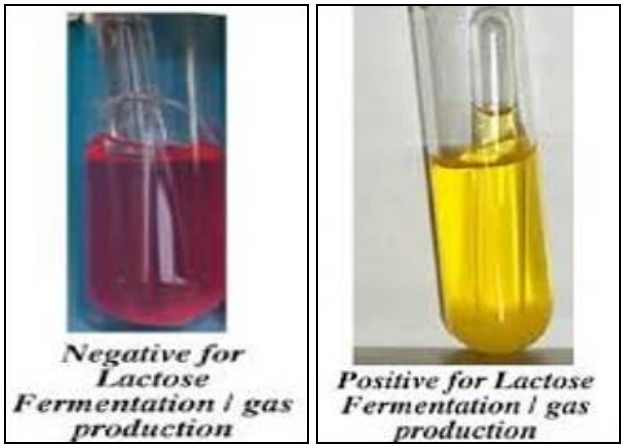

Figure 2: Confirmed Test

In our analysis, 10 (45.46 percent) of the water sample was contaminated with multiple coliform bacteria and 12 (54.54 percent) of the water sample was contaminated with a single coliform bacteria isolate. Out of 12 single bacteria that are coliform, the most common isolate, followed by *Klebsiella* 2 (9.09 percent), *Enterobacter* and *Citrobacter* 1 (4.54 percent), is *E. coli* 8 (36.37 percent).

H_2S Test

The observations showed that with open well and surface water samples at 30, 35 and 44 ° C for 18 and 24 h, maximum H_2S positive (100 percent) results were found. The presence of > 10 coliforms and faecal coliform/100 mL (95% of open well water) was also observed in these samples. 60% of pipe supply samples along with coliforms and faecal coliform positive results were shown in H_2S development by 43% of these samples. On the other hand, 73% of hand pumps developed H_2S, while only 07% and 13% of these samples were found to be positive for coliform and faecal coliform testing. Overall, 78% of the total samples were H_2S positive, while 59% of the samples showed > 10 coliforms and 100 mL faecal coliform/100 mL (**Table 1**).

Table 1: Water Samples Positive with Coliforms, Faecal Coliforms and H_2S Tests

Source	No. of samples	Samples with >10 coliforms/ 100 mL	Samples with >1 faecal coliforms/100 mL	Samples showed H_2S production
Pine supply	40	17 (43%)	17 (43%)	24 (60%)
Hand pump	15	01 (07%)	02 (13%)	11 (73%)
Open well	20	20 (100%)	19 (95%)	20 (100%)
Surface water	15	15 (100%)	15 (100%)	15 (100%)
Total	90	53 (59%)	53 (59%)	70 (78%)

Acidity Test

In the present study, concentrations were close to those previously reported, but MBR-B removed about 80 percent of clofibric acid. There is minimal information on mefenamic acid removal in WWTPs and MBRs. The WWTP in this analysis removed about 70 percent of mefenamic acid. The rate of elimination of MBR-A was not substantially different from that of WWTP, but MBR-B removed about 90% of mefenamic acid. Diclofenac has been reported to have a wide range of elimination rates in biological treatment processes: Ternes(1) reported a reasonably high rate of diclofenac removal in a wastewater treatment plant (69 percent), while Heberer et al . reported a rather low rate of elimination. About 40 percent of diclofenac was extracted by WWTP using an enabled sludge system in the present case[17].

Results of Chloride Test

The chloride concentration measured at the Invertis University Bareilly Boys Hostel was higher than the concentration measured at the Rohilkhand Medical College Bareilly Boys Hostel. Chloride levels vary from 31.20 mg / l to 120.44 mg / l. The maximum value (120.44 mg / l) was registered in the Boys Hostel Invertis University Bareilly pre-monsoon season and the minimum value in the monsoon and Boys Hostel Rohilkhand Medical College Bareilly pre-monsoon seasons. The maximum value of chloride in the premonsoon season in Boys Hostel Invertis University Bareilly is reached in the current study. Increasing chloride in surface waters results in increased salinity, thus affecting the ability of some organisms (stenohaline more than euryhaline) to osmoregulate effectively, which could in turn affect endocrine balance, oxygen consumption after endocrine balance.

pH Test

In order to compare the stability behaviour of two separate Large systems, the first step screening experiments were performed. The first step in this process was to pick the surfactant that gives higher stability when mixing with water and diesel using Span 20 and tween 85. The

performance of the conventional diesel emulsion Period 20 and Tween 85. The highest stability for conventional diesel was found to be 100 hr at 1 percent (w / w) of span 20, while the highest stability at 5 percent (w / w) for tween 85 was 28 hr. Compared with the control sample efficiency of tween 85 (without any surfactant), the stability of tween 85 was slightly higher than the control stability (18 h).

Figure 3: Chloride ion concentration of Invertis campus

Results of Alkalinity Test

Chloride ion (r=0.5555) the value of r is positive showing moderate correlation, which means there is a tendency for high x variable scores to go with low y variable scores and vice versa. For Calcium-Magnesium ions the value of r=0.1693, it is technically $^{+}$ve correlation but the relationship between variable is weak. For EC-Magnesium ions the r value is positive but too low (r=0.0045), although technically $^{+}$ve correlation, the relationship between variable is weak. For Alkalinity-Chromate (r=0.213), the relationship between variable is also weak.

DISCUSSION

The most common cause of gastroenteritis affecting humanity in developing countries is due to a lack of safe and clean water supply. We expect water, since it is important for our lives, to be free of bacterial contamination and other impurities. It may not actually be safe and appropriate, even though water appears clear.

So, to ensure public health, water purification is most necessary. In this analysis, the coliform bacteriological consistency of the different university sites was obtained on the basis of the outcome. The cooler standard of drinking water from the paramedical college, physiotherapy college, dental college, and OPD was adequate compared to hostels for girls and boys. E. In contrast to hospital and engineering college, coli were detected more frequently in water cooler samples of girls and boys hostels. Mix organisms were more detected in water cooler sample in different sites of TMU as compared to the individual organism. Hospital, paramedical college, engineering college, college of education and stadium, dental college, physiotherapy college drinking water cooler is safe as compared to girls and boys hostel, CCSIT, nursing college medical college water cooler. Improper chlorination of water and irregular water inspection are the reasons for the pollution. The high number is revealed by the water cooler. *E. coli*; therefore, by changing the philtre and washing the philtre from time to time as per guidelines, proper maintenance was needed.

Our analysis is comparable to the analysis by Thakur et al., which collected 17 water samples from different sources in that study. Among such, unsatisfactory 52.94%, acceptable 11.76%, excellent 29.4% and suspicious 5.88%. The isolates that were most common were E. With coli and E. Gens. Aerogenes. Both enteric bacteria are known to be an organism that suggests water contamination [43].

Although 73.3 percent of the most prevalent bacteria in the Ngwa and Chrysanthus sample were Klebsiella species, followed by 66.7 percent of Salmonella typhi, E. 53.3 percent E. coli, 26.7 percent Enterobacter species, and 6.7 percent Proteus mirabilis. For several decades, coli has been used in water as an indicator of faecal contamination. Human and animal bacteria are found in large numbers in the digestive tract and are more numerous than disease-causing bacteria and viruses. A profit of *E. coli* it is not capable of

rising and multiplying in water (with the exception of hot and food-laden water). Therefore, the presence of this bacterium in water is a faecal contamination measure.

CONCLUSION

The study revealed that the microbiological parameters of water sampled from various university sites were collected and received. Most of the sites met the basic microbiology criteria suggested by the WHO. However, some sites do not comply with the norm suggested by WHO.

ACKNOWLEDGEMENT

I would like to thank my mentor and supervisor Er. Sachin Shrivastava for his good supervision, advice, and guidance from the very early stage of this research as well as giving me extraordinary experiences throughout the work. Above all and the most needed, he provided me unflinching encouragement and support in various ways. His truly scientist intuition has made him as a constant oasis of ideas and passions in science, which exceptionally inspire and enrich my growth as a student, a researcher and a scientist want to be. I am indebted to him more than he knows.

CONFLICT OF INTEREST

None

REFERENCES

1. Simpi B, Hiremath SM, Murthy KNS, Chandra-shekarappa KN, Patel AN and Puttiah ET. "Analysis of water quality using physico-chemical parameters hosahalli tank in Shimoga District, Karnataka, India". Global Journal of Science Frontier Research (GJSFR), 2011; 1(3), pp. 31-34.
2. White GF, Bradley DJ and White AU. "Drawers of water: Domestic Water Use in East Africa". University of Chicago Press, Chicago, IL, U.S.A., Research (USAR), 1972; 80(1), pp. 62-63.
3. Kondal RY. "Analytic study and microorganism present in rainwater of different areas". Int J Environ Sci (IJS) 2011; 2, pp. 194.
4. Tortora JG, Funke RB and Case LC. "Microbiology an Introduction Media. Including Bibliography and Index Publisher Daryl Fox; New York, Editiion 7th, 2002; pp. 258-60.
5. Nogueira G, Nakamura CV, Tognim MC, Abreu Filho BA and Dias Filho BP. "Microbiological quality of drinking water of urban and rural communities, Brazil". Rev Saude Publica (RSP), 2003; 37(23), pp. 2-6.
6. Park K. "Microbiological aspects of water". Textbook of Preventive and Social Medicine. Jaypee Brothers Medical Publishers; New York, Vol. 16, 2000; pp. 483-504.
7. Levine M. "Differentiation of *E. coli* and *E. aerogenes* on a simplified eosinmethylene blue agar". J Infect Dis (JID) 1918; 23, pp. 43-7.
8. Downie AJ. "Drinking water source quality monitoring (2002-03)". Lakelse Lake and Mountain Creek Surface Water and Jack pine Flats Ground water. Environmental Protection Division. USEPA Drinking Water and Disease. Physicians for Social Responsibility. Washington, DC: USEPA; 2005.
9. Gawthorne T, Gibbs RA, Mathew K and Ho GE. "H_2S papers as presumptive tests for Salmonella contamination in tropical drinking water". Water Sci. Technol (WST), 1996; I, pp. 187–194.
10. Abdelrahman AA and Eltahir YM. "Bacteriological quality of drinking water in Nyala, South Darfur, Sudan". Environ Monit Assess (EMA), 2011; 175, pp. 37-43.
11. Madhuri U, Srinivas T and Sirresha K. "A study on ground water quality in commercial area of Visakhapatnam". Pollution Research (PR), 2004; 23(3), pp. 565-568.
12. Singh A and McFeters GA. "Detection methods for water borne pathogens". Environmental Microbiology. New York, Edition 1st, 1992; pp. 83-87.
13. Manja KS and Kaul RK. "Efficacy of a simple test for bacteriological quality of water". J. Ind. Assoc. Environ. Manage. (JIAEM), 1992; 19, pp. 18–20.
14. Pillai J, Gibbs R, Mathew, K and Ho GE. "Bacteriological Water Testingby H_2S Method", in: Proceeding of 23rd WEDC Conference on 'Water and Sanitation for All: Partnerships and Innovation', Durban, South Africa, 1997; pp. 289–292.
15. Allen MJ and Geldreich EE. "Bacteriological criteria for ground water quality". Ground Water (GW), 1975; 13, pp. 5–52.
16. Grant MA and Zeil CA. "Evaluation of a simple screening test for faecal pollution in water". J. Water SRT, Aqua (JWS), 1996; 45, pp. 13–18.
17. Heberer T. "Tracking persistent pharmaceutical residues from municipal sewage to drinking water". J. Hydrol. (JH), 2002; 266, pp. 175-189.
18. Vieno NM, Tuhkanen T and Kronberg L. "Seasonal variation in the occurrence of pharmaceuticals in effluents from a sewage treatment plant and in the recipient water". Environ Sci Technol (EST), 2005; 39, pp. 8220-8226.
19. Ternes TA, Meisenheimer M, McDowell D, Sacher F, Brauch HJ, Haist-Gulde B, Preuss G, Wilme U and Zulei-Seibert N. "Removal of pharmaceuticals during drinking water treatment". Environ. Sci. Technol. (EST), 2002; 36, pp. 3855-3863.
20. Kimura K, Amy G, Drewes JE, Heberer T, Kim TU and Watanabe Y. "Rejection of organic micropollutants (disinfection by-products, endocrine disrupting compounds, and pharmaceutically active compounds) by NF/RO membranes". J. Membr. Sci. (JMS), 2003; 227, pp. 113-121.
21. Kimura K, Toshima S, Amy G and Watanabe Y. "Rejection of neutral endocrine disrupting compounds (EDCs) and pharmaceutical active compounds (PhACs) by RO membranes". J. Membr. Sci. (JMS), 2004; 245, pp. 71-78.
22. Nghiem LD, Scha¨fer AI and Elimelech M. "Pharmaceutical retention mechanisms by nanofiltration membranes". Environ. Sci. Technol. (EST), 2005; 39, pp. 7698-7705.
23. Clara M, Kreuzinger N, Strenn B, Gans O and Kroiss H. "The solids retention timesa suitable design parameter to evaluate the capacity of wastewater treatment plants to remove micropollutants". Water Res. (WR), 2005; 39, pp. 97-106.
24. Joss A, Keller E, Alder AC, Go¨bel A, McArdell CS, Ternes T and Siegrist H. "Removal of pharmaceuticals and fragrances in biological wastewater treatment". Water Res. (WR), 2005; 39, pp. 3139-3152.
25. Ternes TA, Herrmann N, Bonerz M, Knacker T, Siegrist H and Joss A. "A rapid method to measure the solid-

water distribution coefficient (Kd) for pharmaceuticals and musk fragrances in sewage sludge". Water Res. (WR), 2004; 38, pp. 4075-4084.
26. Urase T and Kikuta T. "Separate estimation of adsorption and degradation of pharmaceutical substances and estrogens in the activated sludge process". Water Res. (WR), 2005; 39, pp. 1289-1300.
27. Holland AJ, Gordon AK and Muller WJ. "Osmoregulation in freshwater invertebrates in response to exposure to salt pollution. Report to the Water Research Commission". Unilever Centre for Environmental Water Quality, Institute for Water Research, Rhodes University, Grahamstown, South Africa. December 2010; pp. 60.
28. Hale RL and Groffman PM. "Chloride effects on nitrogen dynamics in forested and suburban stream debris dams". Journal of Environmental Quality (JEQ), 2006; 35, pp. 2425-2432.
29. Evans M and Frick C. The effects of road salts on aquatic ecosystems. NWRI Contribution Series No. 02:308, National Water Research Institute and University of Saskatchewan, Saskatoon, SK, Canada, 2001; pp. 83-87.
30. Akil HM, Omar MF, Mazuki AAM, Safiee S, Ishak ZAM and Abu-Bakar A. Mater. Des. (MD), 2011; 32, pp. 4107.
31. Khan MY, Abdul Karim ZA, Hagos FY, Aziz ARA and Tan IM. Scientific World Journal (SWJ) 2014; 1.
32. Rizwanul FIM, Masjuki HH, Kalam MA, Mofijur M and Abedin MJ. "Energy Convers". Manage (M), 2014; p. 79-265.
33. Eng P and Scarpete D. Mach. Technol. Mater. (MTM), 2013; pp. 77.
34. Selim MYE and Ghannam MT. Energy Sourc. A, Recovery Util. Environ. Effects 32 256 İleri E, and Koçar G (2014) Fuel 125 44.
35. Maiboom A and Tauzia X. Fuel (F) 2011; 90, pp. 3179.
36. Zhu JH, Shao F, Zhan YH, Yan XL and Zhang B. Colloids Surf., A (CSA), 2006; 290 pp. 19
37. Gupta SC. "Chemical character of ground waters in Nagpur district, Rajasthan". Indian Journal of Environmental Health (IJEH), 1991; 33(3), pp. 341-349.
38. Madhuri U, Srinivas T and Sirresha K. "A study on ground water quality in commercial area of Visakhapatnam". Pollution Research (PR), 2004; 23(3), pp. 565-568.
39. Mulla JG, Farooqui M and Zaheer A. "A correlation and regression equations among water quality parameters". International Journal of Chemical Sciences (JCS), 2007; 5(2), pp. 943-952.
40. Draper NR and Smith H. Applied Regression Analysis - Wiley, New – York, 1966.
41. Snedeco GW and Cohran WO. "Statistical Method". The Lowa State University Press, Ames, Edition 6th, 1967.
42. Kumar J, Jana AK, Bansal A and Garg R. "Development of correlation Between BOD and COD for refinery waste". Indian Journal of Environmental Protection (IJER), 2005; 25(5), pp. 405-409.
43. Thakur M, Negi S, Kumar A, Patil Kumar A and Sharma N. "Prevalence and the determination of nitrite in sea water". 1952

How to cite this article:

Patel S, Saxena S, Bijauliya RK and Shrivastava S. "Physico-chemical parameters for testing of water in Bareilly region". International Journal of Recent Research in Pharmacy (IJRRP), 2020; 1(1A), pp. 146-155.