IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

QUALITY ASSESSMENT OF VARIOUS DRINKING WATER SAMPLES

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ABSTRACT: Water quality has been linked to health out comes across the world. Quality assessment of various water samples have been analysed. This study evaluated the physico-chemical quality of water purifiers. The samples are collected from different water purifiers. In this, various parameters like pH, acidity, alkalinity, chloride content, TDS and calcium were analysed. Traces metal levels in the drinking water samples should be within permissible ranges.

I. INTRODUCTION:

Every human being has a need and a right to have clean water to drink and basic sanitation. To maintain their health and dignity, people require access to clean water and sanitation. Since improved access to water and sanitation improves people's health, strength at work, and capacity to attend education, it is crucial for ending the cycle of poverty. There is an urgent need to enhance access to clean drinking water.[2] Many home water treatment and safe storage methods are being marketed as efficient, suitable, acceptable, and cost-effective ways to raise the standard of drinking water in order to fulfil this global need. Water that is clear and colourless gives an impression that it is safe for human consumption. This may not be always true as many of the bacteria and objectionable matter may be present in visible form. These may be added to water
either naturally or due to certain activities and therefore it is important to understand their environmental significance.[7]

The quality of drinking water has great impact on human health, provision of a safe and adequate supply of drinking water is an essential component in the primary health care. Potable water must have a level of constituents which does not cause a health hazard or
Impair its usefulness to the consumer.[8]

II. MATERIALS AND METHODS:

Acidity: It is a gauge of water's ability to neutralize bases. In unpolluted surface waters, dissolved carbon dioxide is typically the main acidic substance present. Methyl orange acidity is the amount of standard alkali needed to

titrate a particular volume of water sample to pH 3.7. When standard alkali is added, the hydrogen ions in the sample cause the solutes to dissociate or hydrolysed. Acidity thus depends on the indicator's end point.[1]

Procedure

Take 50 ml of sample in a conical flask. Add 3-4 drops of methyl orange. Titrate with 0.02N NaOH until light orange colour appears, then add 2-3 drops of phenolphthalein. Titrate untill changes to pink.

$$A = \frac{V_1 X\ N\ X50\ X\ 100}{V}$$

Where A= Acidity

V= volume of sample taken

N= normality of NaOH

V1= volume of sample consumed.

Alkalinity: Alkalinity is generally used to gauge a liquid's ability to neutralize acids. The presence of hydroxyl, carbonate, and bicarbonate ions in water allows for the possibility of maintaining constant pH.

Procedure

Fill the burette with H2SO4 solution. Take a 100 ml of water sample in flask add few drops of phenolphthalein indicator. Note the initial reading on burette scale, titrate against H2SO4 till the pink colour disappears. Note down the end point reading and get volume of used H2SO4 in ml. Add 1-3 drops of methyl orange. Titrate it till the appearance of light orange colour.

Total dissolved solids: Inorganic salts and trace amounts of organic stuff found in solution in water are referred to as total dissolved solids (TDS).[10] Commonly, calcium, magnesium, sodium, and potassium cations, carbonate, hydrogen carbonate, chloride, sulphates, and nitrate anions make up the main ingredients. Water's flavour may be impacted by the presence of dissolved solids.[3]

Procedure

To measure total dissolved solid. Take a clean porcelain dish which has been washed and dried in a hot air oven at 180°c for 1hr. Now weigh the empty evaporating dish in analytical balance. Let's denote the weight measured as W1. Mix sample well and pour into funnel with filter paper. Filter approximately 80-100ml of sample Using pipette transfer 75ml of unfiltered sample in the porcelain dish. Switch on the oven and allowed to reach 105°c.Place it in the hot air oven and care should be taken to prevent splattering of sample during evaporation or boiling. Dry the sample to get constant mass. Drying for a long duration usually 1to2hrs is done to eliminate necessity of checking for constant mass. Cool the container in a desiccator. Don't leave the lid off for prolonged periods of the desiccant will soon be exhausted.[11] We should weigh the dish as soon as it has cooled to avoid absorption of moisture due to its hygroscopic nature. Samples need to be measured accurately weighed carefully and dried and cooled completely. Note the weight with residue as W2.

$$TDS = \frac{W_1 - W_2\ X1000}{sample\ of\ volume\ (ml)}$$

W1= weight of the total solid +dish
W2= weight of the total suspended solids.

Calcium: The term "water hardness" refers to the total concentration of calcium and magnesium cations in a water sample. Calcium is one of the main cations involved in the water hardness, and its presence in water results from deposits of limestone, gypsum, etc.[9] These cations reduce the cleansing power of soap by forming insoluble salts with it. Additionally, they remove hard water stains from hot water heaters. Between 0 and several hundred ppm of calcium may be present. Titrating the water sample with standard EDTA of known volume and

concentration will yield the amount of calcium. While calcium and magnesium ions are present but haven't yet complexed with EDTA, the indicator gives the solution a pink hue. not even a tinge of pink.[4]

Procedure

A know volume (50ml) of sample is pipette into a clean conical flask, to which 1ml of sodium hydroxide and 1ml of isopropyl alcohol is add. A pinch of murexide indicator is added to mixture. Titrate against EDTA until the pink colour turns purple.[13]

$$calcium\ \left(\frac{mg}{ml}\right) = \frac{T\ X\ 400.5\ X 1.05}{sample\ taken\ in\ ml}$$

T= amount of volume consumed

Chlorides: In nature, chlorides are abundantly found as the salts of sodium (NaCl) and potassium (KCl). Chlorides are frequently found in wastewater and streams.[14] Industrial chemicals such caustic soda, chlorine, sodium chlorite, and sodium hypochlorite sodium chloride are all made using sodium chloride. For controlling snow and ice, calcium chloride and magnesium chloride are frequently employed. Fertilizer manufacture uses potassium chloride.[5]

Procedure

A know volume of filtered sample (50ml) is taken in a conical flask to which about 0.5 ml of potassium chromate indicator is added. Titrate against standards silver nitrate till dichromate start precipitating.

$$Chlorides = \frac{(A-B)\ (N)(35.45)}{Sample\ taken\ in\ ml}$$

A= volume of silver nitrate consumed by sample
B= volume of silver nitrate consumed by blank
N= normality of silver nitrate

PH: The PH scale shows whether water is acidic or alkaline.The PH scale has a range of 0 to 14, with 7 denotin g the idealizedneutral point.A PH number of 7 or above indicates alkalinity, which can impact the water's flavor , whereas a value of 7 or less suggests acidity, which can be corrosive.[6]

Procedure

About 10 ml of the sample is taken in a wide mouth test tube. 0.2 ml of BDH indicator is added and shaken gently. The colour developed is matched with the chart and PH note.

III. RESULTS AND DISCUSSION:

S.no	Parameters	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
1	Acidity	5 mg/ml	40 mg/ml	15 mg/ml	15 mg/ml	45 mg/ml
2	Alkalinity	Light pink	Light pink	Light pink	Dark pink	Dark pink
3	TDS	0.52mg/ml	0.43mg/ml	1.84mg/ml	2.07mg/ml	4.15mg/ml
4	Calcium	9.60mg/ml	10.09mg/ml	8.41mg/ml	12.61mg/ml	22.70mg/ml
5	Chloride	0.2 mg/ml	0.07 mg/ml	0.1 mg/ml	0.07 mg/ml	0.4 mg/ml
6	PH	7.31	7.54	7.50	7.89	8.20

IV. CONCLUSION:

In the present study, we analysed for different parameters of various drinking water samples. In the quality assessment of various water samples, various parameters like acidity, alkalinity, TDS, calcium, chloride, PH are observed. Acidity value in Sample 1, Sample3, Sample 4 are within the limits whereas for Sample 2, Sample 5 it is beyond the limit. TDS level in first 4 water samples is within the limit, whereas it is beyond the limit in sample 5. Calcium content in Sample 1, Sample 2, Sample 3 is within the limit whereas it is beyond the limit for Sample 4 and Sample 5. Chloride content in all the water samples are within the limit. PH for all the water samples is within the limit. The above values have been observed for different parameters for different water samples.

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