

Analysis of Quality Parameters and Microbes Grouping in Water

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ABSTRACT

Water quality refers to the chemical, physical, biological, and radiological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose. Microbiological analysis of the sample give us an idea about that, presence of pathogenic organisms, this includes the isolation and detection of the harmful microorganisms present in that sample. This is to be observed by applying different samples on the nutrient agar medium and all the possible respective selective media. After this the second step is the biochemical analysis which gives the further confirmation of the organisms obtained or found from the water. The groups of organisms of various species to be obtained.

Keywords

Water quality, Microbes grouping, Pseudomonas, Staphylococcus, Bacillus, Klebsiella and Enterobacter species,

INTRODUCTION

In ancient times some cities were able to collect water, which was safe for drinking purpose. But most of the cities were unable to collect safe water, which lead to the water borne diseases. This caused necessity of water treatment. The first type of treatment which was started was filtration of water. Engineers recognized the use and efficiency of the water filtration. But due to financial difficulties most of the city councils did not start its use and save the human lives.

Table 1. Water Quality Parameters

S.No	Parameter	Permissible
1	Temperature	10 ⁰ C To 15.6 ⁰ C
2	Odour	0 to 4 p ₀ value
3	Color	10 to 20 (platinum cobalt scale)
4	Turbidity	5 to 10 ppm (silica scale)
5	Taste	No objectionable taste
6	Total solids	Up to 500 ppm
7	Hardness	75 ppm to 115 ppm
8	Chlorides	Up to 250 ppm
9	Iron and manganese	Up to 0.3 ppm
10	Ph	6.5 - 8
11	Lead	0.1 ppm
12	Arsenic	0.05 ppm
13	Sulphate	Up to 250 ppm
14	Carbon alkalinity	Up to 120 ppm
15	Dissolved oxygen	5 to 6 ppm
16	Biological Oxygen Demand	Nil
17	B-coli	No e- coli in 100 ml
18	Most probable number	One number in 100ml

MATERIALS, DESIGN STRATEGIES, RESULTS

Samples were collected from Mehdiapatnam and Nagole viz., tap water, ground water and panipuri water. Water quality parameters to be analyzed and different media were chosen to find the presence of E-coli in the samples considered.

Nutrient media: preparation and inoculation

Nutrient agar is used as a general purpose medium for the growth of a wide variety of non fastidious microorganisms.

It consists of peptone, beef extract and agar. This is relatively simple formulation provides the nutrients necessary for the replication of a large number of non – fastidious microorganisms.

9 plates of nutrient agar are prepared and labeled as 10-1, 10-2 and till 10-9.

- From 10-1 tube 0.1 ml of sample is inoculated on 10-1 plate aseptically by spread plate technique.
- From 10-2 tube 0.1ml of sample is transferred aseptically to 10-2 plate and inoculation is done by spread plate method. The same procedure is carried out for all the tubes till 10-9.
- After successful inoculation of all the 9 plates in laminar air flow the plates are kept in incubator for incubation at 37c for 24 hours.

The growth can be observed in all the 9 plates the next day i.e. after 24 hours.

Table 2. Composition of Nutrient media

Formula	Quantity (gm)
Peptone	0.5 gm
Beef extract	0.3gms
Yeast extract	0.3gms
Nacl	0.3gms
Agar	2%

Selective media: preparation and inoculation [S.M]

A selective medium is one which retards the growth of unwanted microorganisms while permits the growth of wanted microorganisms to form distinctive colonies. The selective action of the medium is due to addition of certain chemicals to the medium.

➤ Eosin methylene blue Agar - [EMB Agar/ Levine's formulation]

J EMB is a selective media for gram negative bacteria. It is a blend of two stains eosin and methylene blue in the ratio of 6:1.

J Methylene blue inhibits the growth of gram positive organisms. This medium also differentiates between lactose fermenters and non lactose fermenters.

J Composition of EMB Agar is Enzymatic digest of gelatin

1. Lactose – sugar, helps to differentiate lactose fermenters from non lactose fermenters.
2. Dipotassium phosphate
3. Eosin Y : Indicator
4. Methylene blue : ph indicator
5. Agar

Table 3. Composition of Mannitol Salt Agar (MSA) media

Formula	Quantity (gm)
NaCl	75.0gm
Mannitol	10.0gm
Beef Extract	1.0gm
Phenol Red	0.025gm
Agar	15.0gm

➤ After preparation of all the five selective media they are autoclaved at 121-degree Celsius for 15 minutes at 15 lbs pressure. After autoclaving they are poured into their respective plates and kept for solidification.

- Two sets of plates are prepared for all the 5 selective media. In the first set, the plates are inoculated with selective, distinct colonies grown on nutrient agar plates.
- For the second set of plates 10ml of 0.2% saline is prepared and 1gm of soil sample is added into saline and mixed well.
- The second set of all the 5 selective media is streaked by taking 2 – 3 loopful of the inoculums directly from the 10ml saline and 1 gm soil tube.

Both the sets of plates are incubated for 24 hours at 37-degree in incubator and the colonies are examined the next day.



Fig 01. Samples in autoclave

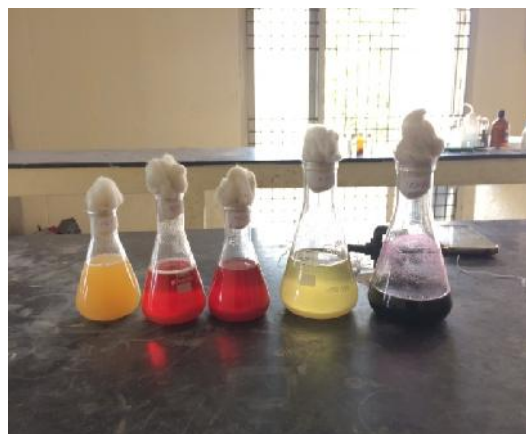


Fig 02 and 03. Samples before and after autoclaving

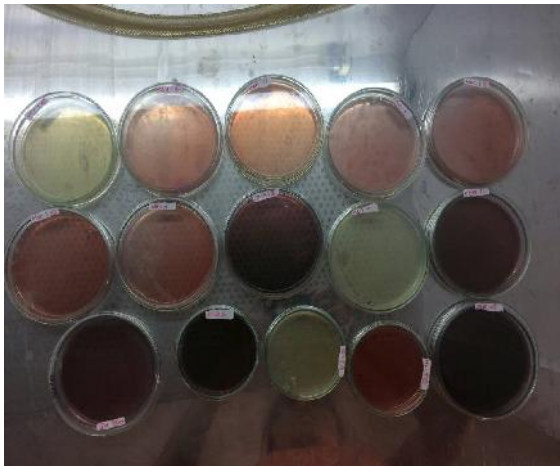


Fig 04 and 05. Samples before and after growth of bacteria

DISCUSSION AND CONCLUSION

The water quality parameters were found to be in the limit range. The following is a detailed discussion of the samples.

Cultural characteristics on nutrient agar media

- 10-2 dilution NAM plate showed green pigmented colonies. *Pigmented colonies* are a characteristic feature of Pseudomonas species.
- 10-4 dilution NAM plate showed *mucoïd, perfectly round colony*. Round, mucoïd and sticky colony is a characteristic feature of Enterobacteriaceae members mostly Klebsiella.
- 10-3 showed a dense growth of perfectly *round colonies, pinpoint* in appearance. Formation of pin point colonies is a characteristic feature of Staphylococcus species.
- In addition to the, *wavy margin colonies, irregular colonies* were also observed.

Cultural characteristics on selective media

- *EMB agar* plates showed the formation of *mucoïd, colorless* colonies in the plates which were directly inoculated from soil sample solution in saline.
- *MSA* plates showed the formation of *colorless, pinpoint colonies* on the media in the plates inoculated from 10-3 perfectly round colonies showing dense growth.
- *Macconkey agar* plates showed the growth of *few pink, mucoïd colonies* in the plates inoculated directly from the soil sample solution in saline.
- *Cetrimide agar* plates showed *green pigmented colonies* on the media in the plates inoculated with culture from 10-2 pigmented colonies.
- *Baird – Parker agar* base showed a dense growth of white colonies on the medias in the plates directly inoculated with soil sample in 10 ml of saline.

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