

**Physico-Chemical analysis of drinking water samples of Pentapadu village**D. Madhava Sarma<sup>1\*</sup>, B. V. Rao<sup>1</sup>, M. V. Lakshmi<sup>2</sup>, B. Chakravarthi<sup>2</sup>, P.S.S. Sravanthi<sup>3</sup> and T.V.S. Padmavathi<sup>3</sup><sup>1</sup>Department of Chemistry, D.R.G. Govt. Degree College, Tadepalligudem, 534166, Andhra Pradesh, India.<sup>2</sup>Department of Zoology, D.R.G. Govt. Degree College, Tadepalligudem, 534166, Andhra Pradesh, India.<sup>3</sup>Department of Botany, D.R.G. Govt. Degree College, Tadepalligudem, 534166, Andhra Pradesh, India.

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**ABSTRACT**

Water contains impurities depending upon its source of water. The physical and chemical impurities impart odour, colour and turbidity. Taste and odour may also be caused by dissolved organic matter or by microorganisms such as algae. Colour is generally due to the presence of colloiddally dispersed organic matter or because of compounds like iron oxide. Odour is caused by the suspended or colloidal matter. Bacteriological impurities are caused by pathogenic bacteria such as E coli and typhoid bacillus. In the present work ground water samples are collected from various places in Pentapadu village. Pentapadu village is located between 16°45'-17°30' Northern Latitude and 80°55'-81°55' Eastern Longitudes of West Godavari District of Andhra Pradesh. Water analysis was carried out and physico chemical properties are studied. It was observed that most of the parameters are differing from place to place and no uniformity was observed. Most of the people in Pentapadu village were using bore water and well water for drinking purposes. These waters are found to be hard waters and found to contain dissolved salts along with bacterial impurities.

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**Introduction:**

Water is elixir of life. Therefore quality of water is of great importance. It depends upon the source from which the water is taken. Rivers, streams, lakes etc. are the various natural resource of water, which contains impurities in most of the cases<sup>8,15</sup>. Ground water also contains impurities which differ from one place to another. Ground water contains dissolved salts of calcium and magnesium present as bicarbonates, sulphates and chlorides<sup>17</sup>. The presence of calcium carbonate and magnesium silicates reduce the heat transfer in industrial processes. Hard water is not useful for drinking, laundry and other domestic usages<sup>5,6,7</sup>.

Hardness is a measure of calcium and magnesium salts present<sup>2,3</sup>, expressed in some common units (ppm). Apart from calcium and magnesium salts, trace quantities of Fe, Al, and Mn<sup>7</sup> may also be present. These are always present in small quantities and can be neglected<sup>10</sup>. The total salts that are present in water will be estimated along with calcium and magnesium.

In the present work ground water samples are collected from various places in Pentapadu village. Water analysis<sup>1,2,3,4</sup> was carried out and the Physico –

chemical properties were studied<sup>9,18</sup> in the best interest of the society. Approximately 50 samples were collected throughout the village, covering all the areas by following the regular procedure<sup>4</sup> and care for the collection of water samples. The samples were given sample numbers

**Experimental:****Reagents:**

1. Standard N/20HCl: Dissolve 9ml of AR conc. HCl in 1lit; standardize this solution with N/20 Na<sub>2</sub>CO<sub>3</sub> solution,
2. Phenolphthalein indicator,
3. Methyl orange indicator,
4. N/20 NaCl solution,
5. N/20 AgNO<sub>3</sub> solution,
6. K<sub>2</sub>CrO<sub>4</sub> Indicator.
7. N/50 EDTA: Dissolve accurately 7.44 gms of EDTA in distilled water and make upto 2 lit.
8. EBT Indicator : Dissolve 0.5 gms of EBT in 500ml of alcohol
9. Ammonia buffer: Add 568 ml of ammonia solution to 70gms of ammonium chloride and make upto 1 lit with distilled water

- i. Carbonate and Bicarbonate<sup>12,13</sup> : Standard Sodium Carbonate solution is titrated against std. HCl soln. using Phenolphthalein and Methyl orange indicator. The titer values are noted and the concentrations of  $\text{CO}_3^{2-}$  and  $\text{HCO}_3^-$  are calculated.
- ii. Chloride<sup>16</sup>: Chloride is estimated by titration with std. Silver Nitrate soln. using Potassium Chromate solution. Indicator Blank correction is made.
- iii. Total Hardness (Ca+Mg)<sup>14</sup>: 100ml of water sample is taken into a 250ml conical flask, 20ml ammonia buffer solution is added and the mixture is titrated against standard EDTA solution using EBT indicator. The end point is from wine red to blue.
- iv. Total Dissolved salts: Sample is taken in weighed china dish and evaporated to dryness. It is cooled to room temperature and again weighed. From the difference of the two weights, dissolved salts are calculated. These values are correlated with instrumentally measured values of TDS.
- v. Sulphate<sup>14</sup>: The sulphate is precipitated as  $\text{BaSO}_4$  with  $\text{BaCl}_2$  soln. The excess  $\text{BaCl}_2$  is estimated by back titration with std. EDTA soln. using EBT indicator in presence of  $\text{NH}_4\text{Cl}+\text{NH}_4\text{OH}$  buffer.
- vi. Zn, Cu, Mn, Fe: These elements are estimated by AAS( Elico make SL-194) using AR grade standards of BDH make<sup>13</sup>.

**Table: 1.** Physico-chemical parameters of drinking water samples of pentapadu village

Sample no.	pH	EC	$\text{CO}_3^{2-}$	$\text{HCO}_3^-$	$\text{Cl}^-$ ppm	$\text{SO}_4^{2-}$	TH ppm	TDS ppm	Zn	Cu	Mn	Fe
S <sub>1</sub>	7.2	4.1	8.92	13.4	28.6	6.54	240	700	9.436	2.249	3.148	7.456
S <sub>2</sub>	7.4	3.4	7.86	13.2	24.6	6.32	290	400	9.326	2.31	3.214	7.412
S <sub>3</sub>	7.1	5.6	7.61	13.5	27.9	7.21	180	400	9.125	2.56	3.25	7.562
S <sub>4</sub>	7.6	8.6	6.54	14.2	25.3	7.89	300	500	9.231	2.654	3.69	7.456
S <sub>5</sub>	7.8	5.7	6.32	14.6	21.3	7.86	440	250	9.874	2.321	3.456	7.123
S <sub>6</sub>	7.3	6.2	7.21	14.5	22.2	7.61	320	630	9.021	2.654	3.789	7.589
S <sub>7</sub>	7.2	5.7	7.89	14.9	25.3	6.54	500	720	9.436	2.987	3.987	7.654
S <sub>8</sub>	7.1	7.1	7.86	14.8	26.4	6.32	730	860	9.436	2.789	3.6954	7.589
S <sub>9</sub>	7.8	8.5	7.61	13.4	23.4	7.21	390	640	9.326	2.456	3.321	7.236
S <sub>10</sub>	7.9	5.4	6.54	13.2	21.3	7.89	330	540	9.125	2.123	3.123	7.412
S <sub>11</sub>	7.7	6.1	6.32	13.5	19.6	6.32	300	200	9.231	2.147	3.654	7.562
S <sub>12</sub>	7.3	4.6	7.21	14.2	25.3	7.21	380	230	9.436	2.258	3.456	7.456
S <sub>13</sub>	7.4	5.9	7.89	14.6	26.4	7.89	258	640	9.326	2.369	3.564	7.123
S <sub>14</sub>	7.2	7.5	6.32	14.5	23.4	7.86	264	530	9.125	2.654	3.231	7.589
S <sub>15</sub>	7.2	6.7	7.21	14.9	21.3	7.61	240	640	9.231	2.321	3.897	7.654
S <sub>16</sub>	7.1	6.8	7.89	14.8	19.6	6.54	200	342	9.854	2.987	3.985	7.589
S <sub>17</sub>	7.8	6.3	7.86	13.4	23.4	6.32	300	742	9.021	2.456	3.123	7.236
S <sub>18</sub>	7.9	6.1	7.61	13.2	21.3	7.21	310	230	9.436	2.456	3.654	7.589
S <sub>19</sub>	7.7	4.6	6.54	13.5	19.6	7.89	200	640	9.326	2.258	3.456	7.654
S <sub>20</sub>	7.3	5.9	6.32	14.2	25.3	6.54	272	530	9.125	2.369	3.564	7.589
S <sub>21</sub>	7.4	7.5	7.21	14.6	26.4	6.32	504	640	9.231	2.654	3.231	7.236
S <sub>22</sub>	7.2	6.7	7.89	14.5	23.4	7.21	318	342	9.854	2.321	3.897	7.123
S <sub>23</sub>	7.2	6.8	6.54	14.9	21.3	7.89	390	742	9.021	2.987	3.985	7.589
S <sub>24</sub>	7.4	6.3	6.32	14.8	19.6	6.54	200	640	9.326	2.456	3.987	7.654
S <sub>25</sub>	7.1	7.5	7.21	14.5	26.4	6.32	204	530	9.125	2.456	3.695	7.589
S <sub>26</sub>	7.6	6.7	7.89	14.9	23.4	7.21	580	640	9.231	2.369	3.321	7.236
S <sub>27</sub>	7.8	6.8	6.54	14.8	21.3	7.89	570	342	9.854	2.654	3.123	7.589
S <sub>28</sub>	7.3	6.3	6.32	13.5	19.6	6.32	452	742	9.021	2.321	3.654	7.654
S <sub>29</sub>	7.3	5.9	7.21	14.2	25.3	7.21	440	640	9.125	2.987	3.456	7.589
S <sub>30</sub>	7.4	7.5	7.89	14.6	26.4	7.89	200	530	9.231	2.456	3.564	7.236
S <sub>31</sub>	7.2	6.7	6.54	14.5	23.4	7.86	272	640	9.854	2.456	3.231	7.654
S <sub>32</sub>	7.2	6.8	6.32	14.9	21.3	7.61	504	342	9.021	2.258	3.897	7.589
S <sub>33</sub>	7.4	6.3	7.21	14.8	19.6	6.54	318	742	9.021	2.369	3.985	7.236
S <sub>34</sub>	7.2	7.5	7.89	14.5	23.4	6.32	390	342	9.326	2.654	3.123	7.123
S <sub>35</sub>	7.2	5.9	7.21	14.9	21.3	7.21	200	742	9.125	2.321	3.654	7.589
S <sub>36</sub>	7.4	7.5	7.89	14.8	19.6	7.89	204	640	9.231	2.987	3.456	7.654
S <sub>37</sub>	7.1	6.7	6.54	14.8	25.3	7.86	280	530	9.854	2.456	3.564	7.589
S <sub>38</sub>	7.6	6.8	6.32	14.5	26.4	7.61	270	640	9.021	2.456	3.231	7.236
S <sub>39</sub>	7.8	6.3	7.21	14.9	23.4	6.54	452	342	9.125	2.987	3.897	7.589
S <sub>40</sub>	7.3	7.5	7.89	14.8	21.3	6.32	440	742	9.231	2.987	3.985	7.654
S <sub>41</sub>	7.1	6.7	6.54	14.5	23.4	7.21	200	342	9.854	2.456	3.456	7.589
S <sub>42</sub>	7.6	6.8	6.32	14.9	21.3	7.86	204	742	9.021	2.456	3.564	7.236

S <sub>43</sub>	7.8	6.3	7.21	14.8	19.6	7.61	580	640	9.021	2.654	3.123	7.654
S <sub>44</sub>	7.3	6.3	7.89	14.5	23.4	6.54	570	530	9.021	2.321	3.654	7.589
S <sub>45</sub>	7.3	6.7	6.54	14.9	21.3	6.32	252	640	9.326	2.987	3.456	7.236
S <sub>46</sub>	7.4	6.8	6.32	14.8	19.6	7.21	440	342	9.125	2.456	3.564	7.123
S <sub>47</sub>	7.2	6.3	7.21	14.8	25.3	7.89	200	742	9.231	2.456	3.231	7.589
S <sub>48</sub>	7.2	7.5	7.89	14.5	26.4	7.86	272	342	9.854	2.987	3.897	7.654
S <sub>49</sub>	7.4	6.7	6.54	14.9	23.4	7.61	504	742	9.021	2.987	3.985	7.589
S <sub>50</sub>	7.2	6.8	6.32	14.8	26.4	6.54	318	640	9.125	2.456	3.456	7.236
S <sub>51</sub>	7.2	6.3	7.21	14.8	25.3	6.32	390	530	9.231	2.456	3.564	7.589
S <sub>52</sub>	7.4	6.3	7.89	14.5	26.4	7.21	200	640	9.854	2.456	3.564	7.654

### Results and discussion:

The results show that the subsurface waters of Pentapadu village are hard in nature. In Pentapadu village first layer of ground water is available at about 30-40 feet depth and a second layer of ground water is available at about 80-120 feet depth. The water samples, which are drawn from first layer, are harder in nature. The water samples which are drawn from second layer are less hard in nature, as shown in the tables. But the two types of water samples are having more hardness than the specifications given by W.H.O., for palatable purposes. The water samples which are drawn from the bores and wells on the side of the canal are soft waters. At the same time the Tank waters are soft in nature because they were fed to the tank from the Godavari canal. TDS values are also less for canal side bore water and well water. The PH of these waters ranges from 7.1 to 7.6. The conductivity values show that the electrolytic concentration is more in the water. The metal contamination is found to be higher than the normal ranges which show that effluents are mixing in these waters either in the surface level or through ground water flows. The overall analysis shows that the water in this region is not good for human health.

### Conclusion:

Hard waters are hazardous to human health which causes deposits of salts in kidneys and in gall bladder. Hard water also causes arthritis. Hard waters form boiler stains in industries and cause damage to them. Hard waters cause wastage of detergents to laundry<sup>11</sup>. In keeping in view of the social implication associated with the research work, we wish to expose these results to the public of Pentapadu village.

Biocel-WD was tested for its efficacy against wood destroying fungus. The method adopted to test the efficacy was as per IS: 4873 (Anonymous, 2008) for white rot fungi. The MDF was treated by addition of the preservative chemical in the glue. The treated and untreated control samples of MDF were exposed to wood destroying fungus for a period of three months. From the experimental findings the following conclusion can be drawn:

1. Biocel-WD at 0.5% on the weight of liquid resin has completely protected the MDF against wood degrading fungus.
2. Biocel-WD has not hampered the glue adhesion strength of the boards.

The new formulation developed by M/s. Excel Industries Ltd., Mumbai, is not irritant to the mucous membrane because of its granular nature as claimed by sponsor. Hence, Biocel-WD is not noxious as compared to the powder formulation of sodium pentachlorophenate.

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