



A- BRIEF ANALYSIS OF MINERAL WATER- SPECIAL REFERENCE TO BELAGATTA VILLAGE OF CHITRADURGA DISTRICT.

NAGARAJA.B M.Sc., M.Phil. Assistant Professor,

Department of Chemistry, S.J.M Arts, Science and Commerce, College, Chandravalli,

Chitradurga-577501 Karnataka

Abstract

CHITRADURGA Located at a distance of 202 kms Northwest of Bangalore, in the heart of the Deccan Plateau, Chitradurga is recognized as the land of valour and chivalry. The district headquarters town, Chitradurga owes its name to “Chitrakaladurga,” or “Picturesque castle”. Water, the most important substance in our evolution, is an integral part of the human life and health in particular. The devoid of water makes life impossible and next to air, it is the most indispensable thing **Mineral water** is water that comes out of the ground naturally and is considered healthy to drink. A glass of mineral water can be referred to as a **mineral water**. Mineral water plays a more and more important role in daily life. Generally, the consumption of mineral water is constantly increasing in the world, especially in developed countries, where the environment is well protected and people require water of high quality. The important roles of mineral water follow from the presence of many valuable useful elements in it such as magnesium, potassium, calcium, and so on. Beyond the above-mentioned elements, in some mineral waters there are some specific elements (iron, iodine, etc.), which have therapeutic properties. Such water is often used for medicinal purposes.

Key words;- *Mineral water, calcium, chloride, filter, belagatta village, drinking water, elements.*

INTRODUCTION

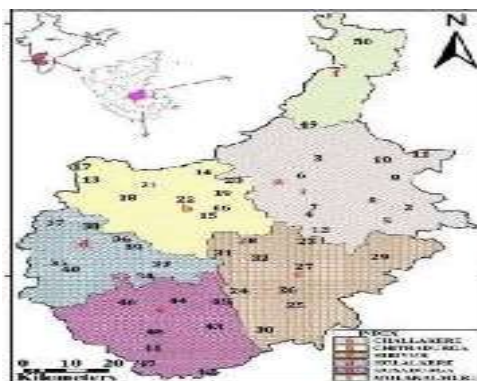
1. General Characteristics of the district: CHITRADURGA Located at a distance of 202 kms Northwest of Bangalore, in the heart of the Deccan Plateau, Chitradurga is recognized as the land of valour and chivalry. The district headquarters town, Chitradurga owes its name to “Chitrakaladurga,” or “Picturesque castle”.

This is a massive fortress on top of granite hills that rises dramatically from the ground. Archaeological remains found in the area, trace its history to the 3rd millennium B.C. The famous King Tipu Sultan, was responsible for its expansion and strengthening Royal Mysore family.

2. Location & Geographical Area.: Chitradurga is located at a Rich in mineral resources - distance of 202 kms, northwest of Bangalore. And has Geographical area of 770702 hectares. And has a literacy rate 64.5% (according to 2011 Census).

3. Topography: Geographic Location 130 34' to 15° 02' ' North latitude 750 37' to 77 01' East longitude and having Temperature 370 C (Max) 150 C (Min). Normal Average Rainfall is 744 mm, Main River is Tungabhadra and Total Geographical Area is spread over 3969 sqkm

4. Administrative set up. The district is divided into Six taluks, namely Chitradurga, Hiriya, Hosadurga, Holakere, Challakere and Molakalmuru. The district is bounded by Tumkur District to the southeast and south, Chikmagalur District to the southwest, Davanagere District to the west, Bellary District to the north, and Anantapur District of Andhra Pradesh state to the east. Davanagere District was formerly part of Chitradurga. It is rich in mineral deposits, including gold prospecting at Halekal, Kotemardi or Bedimaradi, etc., and open cast copper mines at Ingaldhal. It has two sub divisions.



MEANING OF MINERAL WATER

Mineral water is water that comes out of the ground naturally and is considered healthy to drink.

A glass of mineral water can be referred to as a **mineral water**.

The body needs many minerals; these are called essential minerals. Essential minerals are sometimes divided up into major minerals (macro minerals) and trace minerals (micro minerals). These two groups of minerals are equally important, but trace minerals are needed in smaller amounts than major minerals. The amounts needed in the body are not an indication of their importance.

A balanced diet usually provides all of the essential minerals. The two tables below list minerals, what they do in the body (their functions), and their sources in food.

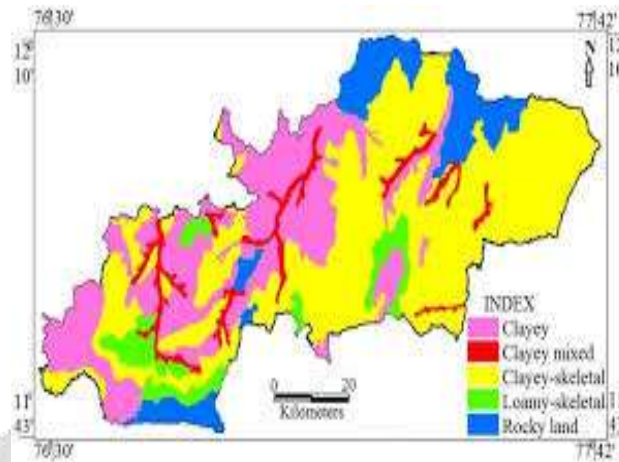
Analysis of Mineral Water

Mineral water plays a more and more important role in daily life. Generally, the consumption of mineral water is constantly increasing in the world, especially in developed countries, where the environment is well protected and people require water of high quality. The important roles of mineral water follow from the presence of many valuable useful elements in it such as magnesium, potassium, calcium, and so on. Beyond the above-mentioned elements, in some mineral waters there are some specific elements (iron, iodine, etc.), which have therapeutic properties. Such water is often used for medicinal purposes. Together with the useful elements noted in mineral water, heavy and radioactive elements can be observed. The interaction of heavy and radioactive elements (Pb, As, U, Th, and Ra) with the human organism can lead to hazardous and unexpected diseases. In the majority of countries, there is legislation governing drinking and mineral water traded on the commercial market that deals with the problems mentioned.



In the following sections, it is the authors' intention to describe the major bottled, natural mineral and therapeutic water available worldwide focusing on Polish examples. The interdependences between the concentrations of the chemical components in the water and some heavy and radioactive elements have been

described. In this chapter, the hazards connected with the presence of heavy and radioactive elements are considered.



Water, the most important substance in our evolution, is an integral part of the human life and health in particular. The devoid of water makes life impossible and next to air, it is the most indispensable thing. A man can survive for a month without food but cannot live even for 10 days without water. Every day we have to drink; the amount of drinking water required, however, is variable and depends on individuals, their physical condition, life cycle, and the climate. To ensure a healthier life, it is imperative to drink water that is safe to drink. Soft drinks and beverages, in particular, sugar-sweetened beverages became popular. But health concerns from the use of such sugary beverages have shifted the bias to bottled water. As the name implies, bottled water is a drinking water, packaged in either plastic or glass containers without any added sweetener. In consideration of the today's life style, bottled water rendered it as a smart and healthy choice among other drinks. Bottled water is, however, not proven to be better than tap water under normal conditions. Rather, manufacture of bottled water may increase CO₂ level of the environment. To ease the contamination of tap water in case of poor supply and the emergencies during natural disaster, bottled water has evolved as the best option.

Water is packaged mainly in polyethylene terephthalate (PET) bottles, which is 100% recyclable. The bottled water industries strongly support recycling of plastic bottles but due to unawareness among public, only a small fraction of the total bottles are recycled and the rest is dumped either in land or water, which create several environmental issues. Energy consumption during the manufacturing of bottles and their packaging, transportation are also important factors to be considered to avoid environmental risks. Extensive use of bottled water may be avoided to move a step ahead toward environment protection. In the present review, we address every aspect of bottled water in the current global context, from sales, consumption, cons-pros, etc., to environmental concern.



Mineral water is a special form of groundwater, from which it differs in its composition and properties. The criteria for differentiation can lie in increased mineral content, elevated carbon dioxide content, elevated spring (source) temperature, or the presence of higher concentrations of trace substances such as iron, iodine, sulfur, fluoride, or radon. Such mineral springs have been preferred by people from ancient times, whether for drinking or bathing, because mineral waters often have, or are associated with, beneficial health properties.

There is no generally applicable definition of mineral waters. They are often bottled or canned and marketed as beverages on account of their pleasant taste and their claimed beneficial properties. Most countries, however, have regulations concerning such mineral waters that define what is required of the product.

The countries of the European Community, for example, have guidelines for the production of, and trade in, natural mineral waters that have been adopted as national law by the individual member states. Here, it is required that natural mineral water shall differ appreciably from drinking water. Mineral water is water that meets the following special criteria:

- It has its origin in underground water resources that are protected from contamination and obtained from one or more natural or artificial sources.
 - It is of original purity.
 - It possesses particular nutritional–physiological effects on account of its content of minerals, trace elements, or other components.
 - Its composition, temperature, and other characteristics remain constant within defined limits of natural variation.

Some countries (e.g., Germany) lay down maximum permissible concentrations for toxic substances (Table 1). The European Commission is currently discussing uniform limits for such substances; in some cases the limits will be more stringent.

Substance	Limit (mg l ⁻¹)	Calculated as
Arsenic	0.05/0.005 ^a	As
Cadmium	0.005	Cd
Chromium, total	0.05	Cr
Mercury	0.001	Hg
Nickel	0.05	Ni
Lead	0.05	Pb
Antimony	0.01	Sb
Selenium, total	0.01	Se
Borate	30	BO33–
Barium	1	Ba
Sodium	20 ^a	Na
Nitrate	10 ^a	NO ₃
Nitrite	0.02 ^a	NO ₂
Sulfate	240 ^a	SO ₄
Fluoride	0.7 ^a	F
Manganese	0.05 ^a	Mn

A Declaration: Suitable for the preparation of baby food.

The use of the product description ‘natural mineral water’ for such a packaged beverage requires that compliance with the defining characteristics has been checked officially and that the product has been recognized officially as a natural mineral water.

The natural purity requirement presumes that there is no microbiological or chemical danger of anthropogenic or environmental origin.

Once a source has been officially recognized for natural mineral water, it must be exploited in such a manner that all possibility of contamination is avoided and that the characteristics of the water that justify its being a natural mineral water are maintained when it leaves the source.

It is forbidden to process the water or to add substances to it during the packaging, with the exceptions that unstable components such as iron or sulfur compounds may be removed, and carbon dioxide may be added to the water. In particular, it is forbidden to disinfect the water by any means or to add microbiological inhibitors. Any other treatment to change the microbial count of the natural mineral water is also forbidden.

In the state, there are no uniform, special rules for mineral water. It is covered by the regulations of the bottled_water standards. If the major components exceed the maximum contaminant level (MCL) for drinking water, this must be stated on the label, for instance; the following phrases are used in

This is a mineral water and should not be used as a sole source of drinking water if bottled water products have received exemption from only the esthetic-related inorganic_chemical MCL or This water contains levels of minerals in excess of standards for drinking water established by the State Commissioner of Health and, therefore, should not be used as a principal or sole source of drinking water. if bottled water products have received exemption from the health-related MCL.

Furthermore, in the state, all bottled water must be disinfected, which is forbidden in Europe. The standards in village allow, in this case, that imported water, which may not be disinfected in its land of origin, may be imported into village without being subjected to disinfection With certain exceptions, the rules for many other countries lie between these two extremes, of mineral water that differs appreciably from drinking water in the villages of the Eu Community and mineral water that is on the same footing as drinking water in the village.

The definition of mineral waters may differ in different countries. The rules and regulations for marketing the mineral water in the country of origin and outside that village may also differ. These differences in the rules and regulations may hinder the free movement of packaged mineral water outside the boundaries of the countries producing special brands. Efforts are being made, especially in the Community, to eliminate these differences in order to promote the free movement of the packaged natural mineral waters.

The producers of the natural mineral water, however, must fulfill the basic laws and regulations concerning foodstuffs and water intended for human consumption. From a global point of view, there is a standard by state. In Communities, in response to the opinion of the state delivered in October 1995 on the approximation of the laws of the member states relating to the exploitation and marketing of natural mineral waters, certain amendments have been made. These amendments, however, do not differ from those of the village codex standard. The following conditions apply to natural mineral waters packaged for human consumption, particularly in affluent villages.

1. Natural mineral water, in its state at source, may not be the subject of any treatment or addition other than the addition or elimination of carbon dioxide. It must contain a certain amount of dissolved mineral salts. In many industrialized countries, this amount is around 500 mg l^{-1} .

2. Natural mineral water, in its state of source, must meet the specified microbiological requirements. It must be free from all pathological organisms. After packaging, mineral water must not have more than a specified total colony count. In many villages, especially in industrialized countries, the figure may not exceed 100 per ml at $20\text{--}22^\circ\text{C}$ in 72 h on agar or agar–gelatine mixture and 20 per ml at 37°C in 24 h on agar. The total colony count shall be measured within 12 h following packaging, the water being maintained at $4\pm 1^\circ\text{C}$ during this 12-h period. At source, these values should not normally exceed 20 ml^{-1} at $20\text{--}22^\circ\text{C}$ in 72 h and 5 ml^{-1} at 37°C in 24 h, respectively, on the understanding that they are to be considered as guide figures and not as maximum permitted concentrations. Further, the natural mineral water may not contain any organoleptic defects.

3. All containers used for packaging natural mineral water shall be fitted with closure designed to protect against any adulteration or contamination.

4. The labeling of the containers used for the packaging of mineral water must include certain mandatory information. The name should specify the type of water such as ‘natural mineral water,’ ‘naturally carbonated mineral water,’ and ‘carbonated natural mineral water.’ The label should also give the place where the spring is exploited and a statement of the analytical composition giving its characteristic constituents. It is not permitted to market natural mineral water from the same spring under more than one trade description. It is also prohibited to mention both on the packaging or labels a characteristic that the water does not possess, especially with regard to treatment or cure of human illness.

5. Exploitation of a natural mineral water spring shall be subject to permission from responsible authority of the country where the water has been extracted.

6. Equipment for exploiting the water must be so installed as to avoid any possibility of contamination and to preserve the properties of the water at source.

7. When the natural mineral water at source becomes polluted and no longer meets the microbiological criterion for human consumption, all operations leading to the commercial sale should be suspended. It is the responsibility of the local authority to undertake periodic checks to control the original characteristics of the natural mineral water.

8. In developing countries, the regulations concerning the marketing of natural mineral water vary significantly from country to country. Even for the export of natural mineral water from industrialized to developing countries, the directive above may not apply.

The use of natural mineral water or spring water as an ingredient in soft drinks or reconstituted fruit juices is permitted. This can present a useful marketing opportunity as the nature of the ingredient can be referred to in the list of ingredients (in the case of soft drinks).

Water is not required to be listed as an ingredient when reconstituting concentrated fruit juice. The status of a natural mineral water (as water) requires that it is 'bottled at source' and thus precludes the use of a mobile tanker if the reserved description is to be maintained. There is no regulation preventing the use of a tanker to import natural mineral water to a plant but the reserved description may not then be used.

Spring water may also be used as an ingredient in the manufacture of soft drinks. It should be borne in mind that although there may be a marketing advantage in using natural mineral water or spring water, depending on the source, the physico-chemical characteristics may not be ideal for the manufacture of soft drinks or the reconstitution of fruit juice concentrates.

Chloride also occurs in bedrock cementing material, connate fluid inclusions and as crystals deposited during or after deposition of sediment. Chlorides in groundwater are originated from various sources including the dissolution of halite & related minerals, marine water entrapped in sediments and anthropogenic sources. Although chloride is often an important dissolved constituent in groundwater contamination from sewage and various types of industrial wastes by Hem (1985; 1993). Chloride ranges from 49-481 mg/L, in which 24% of total samples exceed the permissible limit with reference to WHO Standards which affects the taste of the water (Fig.3b). Chlorides are observed in natural water due to the dissolution of salt deposits and effluents from chemical industries. Chloride is a widely distributed element in all types of rocks in one or the other form and its affinity towards sodium is high. In case of high temperature and reduced rainfall conditions the chloride concentration is found to be high. Soil porosity and permeability also shows their key role in building up chlorides concentration. The chloride ion in natural water occurs fairly in low concentrations, usually less than 100 mg/L, unless the water is brackish or saline by Fetter (1999). High concentrations of chloride give rise to salty taste of water and beverages, while excess of 250 mg/L concentration give rise to a detectable taste in water. Chloride in drinking water originates from natural sources, sewage, industrial effluents, urban runoff containing saline intrusion by WHO (2004).

CONCLUSION;-

The spatial and time variant changes of mineral water quality are assessed through graphical representations. The predominance of chloride ion in certain areas reflects greater residence time of mineral water. The present study reveals that the influence of geological (geogenic) conditions is found to be more than the anthropogenic activities and supports the increasing concentration of physico-chemical characteristics in mineral water. The factors like slow circulation, longer period of contact between aquifer and water, dissolving of minerals at the time of weathering, residential time, drainage pattern and surface water link are the main factors responsible for the vary in chemical. Concentrations of mineral water. Porosity of the soil and rock also alters the characteristics of the mineral water. Recharge process of rainfall water dilutes the constituents of the mineral water, but also raises the mineral water level that depletes due to large-scale exploitation. The toxic effluents from different sources are being contaminating the soil and leaching into the mineral water through seepage areas (lineaments). The chemistry of mineral water existing in hard rock terrain is mainly controlled by the rock-water interaction mechanisms. The total dissolved solids are expected to increase along the length of the flow path and also the time of residence. Mineral water is a major environmental parameter; its quality degradation is an issue of significant societal and environmental concern.

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