2. REVIEW OF LITERATURE

Water is the universal solvent and all living beings depend on the water for surviving. But due to the rapid growth of population, urbanization and industrialization the water has become polluted. Dix, H.M. (1981) and Sharma, C.B. et al. (1987) are the main contributors to the studies of water pollution. The drinking water, because of its integrated relationship with the human and animal health has been extensively worked out all over the world. So there is an increasing need to assess the quality of water. The WHO prescribed the criteria of drinking water in 1971. Later, bacteriological standards of drinking water were also prescribed (WHO 1984). Fluoride higher than 2ppm may cause Osteoporosis and fluorosis. High nitrate is alarming as it indicates possibility of seepage from sewage. Batheja, K. et al. (2008). In the recent years the contamination of the different sources of drinking water by the nutrients such as nitrate, phosphate and also the metallic elements has been worked out extensively (Spalding et al., 1982; Hill, A.R., 1982). Bacteria as indicator species of organic pollution is a subject of topical interest. Clark, J.A. et al. (1982) worked on the municipal water supply to test the presence or absence of pollution indicating bacteria and found that species of endemic nature were E. coli, Enterobacteraergenes, Aeronomashyrophilia, Klebesiellapneumoniae and Citrobacterpeundii. Keswick and others (1982) worked on the survival of enteric viruses and indicator bacteria in ground water. It is now almost certain that the surface wash off containing bacteria of all kinds, metallic and toxic effluents, gradually percolate in the earth stratum and reach the water table below. The same is true for inorganic fertilizers. Similarly Stender, J.O. and Adams, J.C. (1982) investigated the effects of black water upon the viability of indicator bacteria.

Some chemical components such as pH, electrical conductivity, total dissolved solids, chlorides, fluorides, nitrate etc. of ground water of different districts of Rajasthan including Churu, Nagaur, Barmer, Bikaner, Jalore and Jaisalmer have been discussed by Ozha, D.D. & Jain, P.C. (1992) and Ozha, D.D. & Sharma, D.C. (1995). Fluoride and nitrate levels in ground water of arid districts of Rajasthan have been worked out by Gopal, R. et al. (1983). Gupta et al. (1993) recorded the TDS and Fluoride from various districts of South-Eastern Rajasthan. Effects of fluoride contents in ground water Ibrahim M. et al. (2011). Fluoride concentration in rural parts

Hill, A.R. (1982) worked out the nitrate distribution in ground water in Canada. Nitrate value in ground water in some districts (Churu, Barmer etc.) of Rajasthan have been recorded by Ozha, D.D. et al. (1993 b). Nitrate levels in underground water of some district of Rajasthan have also been recorded by Rai and Gulati (1997).

Heavy metal contamination of the ground water has been investigated by Mohammad, A. and Raziuddin (1986 a & b). The sources and distribution of trace metals including iron in aquatic environments have been thoroughly described by Batley, G.E. (1983).

The bicarbonates are common constituents of natural water and are introduced through the solvent action of water containing dissolved carbon dioxide on calcium and magnesium carbonates, sulphates and chlorides for calcium and magnesium are also responsible for hardness. Thus, calcium and magnesium are the principle cations causing hardness. Iron, aluminium, manganese, strontium and zinc cause hardness but to a relatively little extent (Purohit, S.K. 1986).

The role and distribution of carbonate, bicarbonate and pH in the ground water of the Nile delta have been given by Chandour, E.L. et al. (1985).

Acute toxicity of copper sulphate to fresh water prawns have been carried out by Lodhi, H.S. et al. (2006).


Graphical and statistical approaches to assess the quality of ground water of Sikar city, Rajasthan have been given by Shyam, R. and Kalwaniya, G.S. (2011).

The chemical profiling of ground water of Alkharj in Saudi Arabia has been given by Jahangir et al. (1988).
Chemical surveillance of drinking water supply in desert city Bikaner has been carried out by Saxena, M.M. and Chhabra, C. (1998).

A comparative study on the quality and tropic status of some desert water employing bio-indicators and indices has been worked by Chadha, M. (1999).

Biosensors for potential environment applications continue to show advances in areas such as detection of heavy metals, biocides, pollutants, microorganisms and various polyaromatic compounds. Also, water toxicity testing, mutagen analysis and BOD estimation is facilitated by use of biosensors. Gautam, P. et al. (2012).

Sewage is known to give out microbes in the soil. Liu, O. (1982) observed that 90-98% in the soil and further opined that there was little microbiological contamination of ground water through the disposal of sludge on the farm land. This situation however, is possible when the water table is not high. The bacterial re-growth in drinking water has been studied by Dott, W. (1983). Well water has only a few workers of research on it, and mention could be made of Adesiytin et al. (1983) and Mazid et al. (1984). In Rajasthan work on the well water is done by Johri, S.N. and Khetawat, G.K. (1984).

Water quality assessment of open wells in and around Chavara industrial area, Quilon, Kerala have been thoroughly described by Shaji, C. et al. (2009).

The studies of Kumar, A. and Gupta, A.K. (2006) showed the acute toxicity of Mercury in relation to water hardness and temperature to the fingerlings of Indian major carps i.e. catla, rohu and mrigal has been evaluated using static bioassay.

The presence of coliform in water does not establish that the pathogens are present and some coliform are not viewed as pathogenic and only few are disease causing bacteria. However, the number of coliform present in the water does provide a measure of the probability that water born pathogens are present (Lamb and Rowe, 1987). It is interesting to know here that the reduced or low level of coliform and even their elimination is sometimes not accurate in indicating the safeness of drinking water. For example, this is evidence that Giardia & Lambila may be present in drinking water despite the negative test of coliform (Craum 1986). In spite of this, the coliform test to evaluate the water quality from the microbiological point of view is still
in vogue. For the presence of pathogenic bacteria, the group of bacteria have been detected by a comparative study on the physicochemical and bacterial analysis of drinking borewell and sewage water in the three different places of Sivakasi by Radha Krishnan, R.et al.(2007).


Valecha, V.et al. (1988) and Trivedi, R.et al. (1988, 89) studied seasonal fluctuation, differentiation of coliform group and distribution.

Oger, C.et al. (1981) reported that temperature greatly favours the significance growth of micro flora (bacteria).

The pollution status of perennial pond was studied on the basis of seasonal variation of different bacterial counts (total coliform, faecal coliform and faecal streptococci) by Jakher, G.R. (1997).

Jain, N.C. (1997) has studied the well water samples of Bikaner district and has observed that all the well water samples have total coliform below the 10 MPN/100 ml.

Kumar,D. and Ahmed, S. (2003) have studied the seasonal behavior of spatial variability of groundwater level in a granitic aquifer in monsoon climate.

Rodvang, S.J.et al.(2004) have studied changes in Groundwater quality in an irrigated area of Southern Alberta.

Datta, P.S. (2005) has studied groundwater ethics for its sustainability.

The distribution of Iodine in Soil-Water system in the GandakBasin,Bihar has been investigated by Ghose, N.C.et al.(2003).

Some water quality parameters such as Dissolved oxygen (DO), Biochemical oxygen Demand (BOD), Most Probable Number (MPN), Turbidity, Total Dissolved Solids (TDS) and pH measured were used to Evaluation of water quality index for drinking purposes of Subarnarekha in Singhbhum District by Parmar, K.and Parmar, V. (2010).
GIS Study on Vulnerability Assessment of Water Quality in a part of Cauvery River have been studied by Hema,S. et al. (2010).

Toxicity assessments of waste water from a textile industry to Cyprinuscarpio have been given by Roopdevi, H. and Somashekar, R.K. (2012).

The nickel accumulation was significantly influenced by pH and hardness of water. Karthikeyan, S., Palaniappan, PL. RM. and Sabhanayakam, S. (2007).

Macrophytic diversity was higher at the point where nallahas join the reservoir and in the areas where agricultural practices are performed. Water quality and conservation management of Ramsagar reservoir, Datia, Madhya Pradesh have been carried out by Garg, R.K. et al. (2009).

Mapping of fluoride villages was done by using the Isopleth technique by statistical method. Alagumuthu, G. and Rajan, M. (2010).