Research Journal of Recent Sciences _____ ISSN 2277-2502
Vol. 4**(IVC-2015),** 1-2 **(2015)** *Res. J. Recent. Sci.*

Short Communication

Analysis of Water after Holi Festival

Vartak Sheetal
Viva College, Virar, INDIA

Available online at: www.isca.in, www.isca.me
Received 31st March 2015, revised 22nd April 2015, accepted 28th May 2015

Abstract

In the past, the use of natural colours such as Haldi, Kumkum, Sandal Powder, etc to celebrate Holi festival had a medical significance. However, now a day chemically produced industrial dyes have been used to take their place in the most parts of India. Lack of control over the quality and content of these synthetic colours leads to an adverse effect on all living beings. These colours are highly structured polymers and are very difficult to decompose biologically. The use of heavy metal based colour pigments is reported to cause water pollution. Many times, this polluted water gets mixed with sea water or other water resources. All these combined together is proving to be a substantial environmental threat. This study was taken up with an initiative to determine the extent of effects that the Holi colours have on water and to suggest the alternatives in order to save our environment. In this study the sample of waste water after Holi was tested in the laboratory for different physico-chemical parameters such as temperature, pH, colour, turbidity, total hardness, total dissolved solids, heavy metal using standard methods. The results obtained were verified with permissible limits of World Health Organisation (WHO) in order to determine the effect of Holi colours on water and the calculated risk for all living beings.

Keywords: Hoil, natural colours, synthetic colours, water pollution, substantial environmental threat, physico-chemical parameters, permissible limits of WHO.

Introduction

India is a nation of festivals. In the month of March people celebrate *Holi* all over India. It is also known as festival of colours. There is Holika Bonfire in the evening of a day before *Holi*. The next day morning people play and colour each other with dry powder and coloured water.

Traditional *Holi* was celebrated with natural colours. But now a day chemically produced industrial dyes are used to celebrate *Holi*. These colours are openly sold without any information about their nature, purity, toxicity, etc. They cause water pollution and environmental problems[1]. They are very harmful for human beings as well as for plants because these colours interfere with passage of sunlight into stream and hence reduce photosynthetic activity. They also prevents absorption of oxygen into water. Perceptible colours caused more problems because of invisible contamination. When these synthetic colours get mixed with river water or any surface water system, it results in inhibition of microbial activity and consequent reduction in the rate constant of biological processes[2]. The ground water systems are also affected by these pollutions because of leaching from the soil. Water is the basic need for all living beings on the earth. It is indispensable for human beings.

The aim of this study was to create an awareness among people regarding hazardous effects of synthetic colours used to celebrate *Holi* and also to suggest healthier practices for a safe and eco friendly *Holi*.

Method and Materials

The water sample was collected in a plastic bottle, a day after celebration of *Holi* festival from a pit to which drained all the waste water from a building in Mumbai. Some colours might have absorbed into the soil.

The sample of waste water was analysed in the laboratory for different physico-chemical parameters such pH, total hardness, total dissolved solids, turbidity, colour and heavy metal using standard methods. The sophisticated and validated instruments like pH meter, Colorimeter, Nephelometer, Atomic Absorption spectrophotometer, etc. were used to perform this analysis. The calibrated apparatus and chemicals of analytical reagent grade were used to get more accurate results. The results are depicted in table-1.

pH is a measure of the acidity or alkalinity of water. It was measured using a digital pH meter.

Total hardness of water depends on the concentration of multivalent cations in the water especially calcium and magnesium ions. It was determined by titrating a known volume of sample water against 0.01N EDTA solution using Eriochrome Black T as an indicator.

Total Dissolved Solid (TDS) content in water is also an important parameter. It was determined by filtering a known volume of sample water and evaporating it to dryness in a

previously weighed evaporating dish. It was then dried in a drying oven at 180 degree for 1 hour to get a constant weight.
Turbidity is the cloudiness of a fluid caused by large numbers of particles that are generally invisible to the naked eye. The measurement of turbidity is a very importantant test of water quality. It was measured using Nephelometer.

The colour of water is also an important property. The colour of sample water was determined by using colorimeter. The wavelength of maximum absorbance for sample water was determined by measuring the absorbance values at different wavelengths in the range of 400 nm to 700 nm.

The concentration of heavy metal Chromium (Cr) in sample water was determined using atomic absorption spectrophotometer. The standards of concentration 5 mg/l to 20 mg/l were used for measurement.

Table-1

Parameter	Sample reading	Method
Ph	6.36	Digital pH meter
Total Hardness	720ppm	Titration
TDS	2400 mg/l	Filteration & Evaporation
Turbidity	11.7 NTU	Nephelometer
Colour	Violet	Colorimeter
Heavy metal(Cr)	0.200 mg/l	Atomic Absoption Spectrophotometer(AAS)

ResultS and Discussion

This study showed the impact of synthetic colours used during *Holi* on water. The physico-chemical parameters of sample water were studied extensively.

pH is an extremely important parameter. The pH of sample water was 6.36. According to WHO guidelines the permissible limit for drinking water is 6.5 to 8.5[3]. The decrease in pH also affects the chemical reactions in aquatic environment.

The total hardness of sample water was calculated as 720 ppm which is quite higher than the permissible limit of 10-500 ppm for drinking water. A variety of diseases are correlated with the hardness of water, including various types of cancer. Total hardness of water is also very important to fish culture.

The TDS of sample water was found to be 2400 mg/l which is exceeding the permissible limit of 500-1000 mg/l for drinking water and 2000 mg/l for irrigation water. As TDS of water increases, it causes increase in the density of water, decrease in the solubility of gases (like oxygen) and hence decrease in utility of water for drinking, irrigational, and industrial purposes.

The turbidity of sample water was recorded to be 11.7 NTU whereas according to WHO guidelines the turbidity of drinking water should not exceed 5 NTU. As the turbidity level in drinking water increases, the risk that people may develop gastrointestinal diseases also increases. In water bodies like lakes, rivers, the amount of light reaching lower depths gets reduced due to higher turbidity level of water. This in turn can reduce growth of submerged aquatic plants and consequently the species which are dependent on them, such as fish and shellfish are affected. The ability of fish gills to absorb dissolved oxygen is also affected by higher turbidity[3].

The colour of sample water was found to be violet. Colour interferes with passage of sunlight into stream and hence reduces photosynthetic activity. It also prevents absorption of oxygen into water.

The concentration of heavy metal Chromium in the sample water was 0.200 mg/l which is again high and may cause serious health hazards.

Conclusion

Thus due to the synthetic colours of *Holi* in sample water the physico-chemical parameters of the water collected for this analysis purpose were changed cosiderably. Synthetic colours prove to be polluting water and creating environmental problems. Hence there is an urgent need to put a control on manufacturing and quality of these colours. Safe natural colours derived from natural sources such as vegetables, leaves and flowers should be used[4]. The large scale wastage of water during *Holi* celebration is also an issue of concern. Therefore people should be encouraged to play dry *Holi*.

References

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