



RESEARCH ARTICLE

**Determination of Sodium and Potassium Content Present in Water Sample
Collected from Goda, Kal and Savitri River by Flame Photometry**

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Manuscript No: IJPRS/V5/I4/00157, Received On: 30/11/2016, Accepted On: 10/12/2016

ABSTRACT

In human diet minerals are vital elements, sustaining in intra and extracellular body processes. Hence it becomes essential to get these minerals from various sources in required amount. Flame photometry is very suitable method for qualitative and quantitative determination of several cations, especially for metals that are easily excited to higher energy levels at a relatively low flame temperature (mainly Na, K, Rb, Cs, Ca, Ba, and Cu). The present article includes the Comparative studies on Sodium and Potassium content present in water sample collected from Goda (Goregaon), Kal (Mangaon) and Savitri River (Mahad).

KEYWORDS

Flame photometry, Sodium, Potassium

INTRODUCTION

Flame photometry is a branch of atomic spectroscopy in which the species examined in the spectrometer are in the form of atoms. The other two branches of atomic spectroscopy are atomic absorption spectrophotometry and inductively coupled plasma-atomic emission spectrometry (ICP-AES, a relatively new and very expensive technique not used in Standard base experiments). In all cases the atoms under investigation are excited by light. Absorption techniques measure the absorbance of light due to the electrons going to a higher energy level. Emission techniques measure the intensity of light that is emitted as electrons return to the lower energy levels. Flame photometry is suitable for qualitative and quantitative determination of several cations, especially for metals that are easily excited to higher energy

levels at a relatively low flame temperature (mainly Na, K, Rb, Cs, Ca, Ba, Cu). This technique uses a flame that evaporates the solvent and also sublimates and atomizes the metal and then excites a valence electron to an upper energy state. Light is emitted at characteristic wavelengths for each metal as the electron returns to the ground state that makes qualitative determination possible. Flame photometers use optical filters to monitor for the selected emission wavelength produced by the analyte species. Comparison of emission intensities of unknowns to either that of standard solutions (plotting calibration curve), or to those of an internal standard (standard addition method), allows quantitative analysis of the analyst metal in the sample solution. Flame photometry is based on measurement of intensity of light emitted when metal is introduced into a flame. A photoelectric flame photometer is a device used in inorganic chemical analysis to determine the concentration of certain metal ions, among them sodium, potassium, lithium, and

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calcium. The wavelengths of the color tell us what the element is and the color intensity tells us how much element is present. Flame photometry is also named as flame emission spectroscopy because of use of flame to provide the energy of excitation to atoms introduced into the flame. In principle, it is a controlled flame test with the intensity of the flame color quantified by photoelectric circuitry. The sample is introduced to the flame at a constant rate. Filters select which colors the photometer detects and exclude the influence of other ions. Before use, the device requires calibration with a series of standard solutions of the ion to be tested.

The Flame photometry technique as proven to be one of the most reliable and used technique for the determination of concentration of Sodium, Potassium, Calcium and Magnesium.

MATERIALS AND METHODS

Material

Sodium Chloride, Potassium Chloride, Distilled water, Water sample collected from Goda, Kal and Savitri River.



Figure 1: Flame photometer (Model No. EQ885A)

Apparatus

Volumetric Flasks, Beaker, Glass Rod.

Preparation of Standard Solution

An AR grade sodium chloride (NaCl) was weighed and transferred it into 1 liter volumetric flask through a funnel. Simultaneously weigh 1.909 g of AR quality potassium chloride (KCl) and transfer it into the same volumetric flask through the same funnel. Add double distilled

water to the flask, dissolved the crystals and make up the solution to the mark with double distilled water. The stock standard solution contains 1000 ppm/1000 ppm of sodium and potassium. From this stock standard solution 100, 80, 60, 40, 20 ppm solution of lower concentration was prepared. Aspirate Distilled Water and set the read out 00 by adjusting the zero control. Aspirate the standard solution that has higher concentration adjust the nobe to 100. For optimum performance the instrument should be allow 15 min to warm up during this warm up period a blank demonized water sample should be aspirated. Emissions were noted for all standard solution. Lastly water sample solutions were aspirated and emission was noted.

RESULT AND DISCUSSION

Table: 1 Emission for Na⁺ and K⁺ with respective concentration and unknown sample

Sr. No.	Concentration in ppm	Emission For Na ⁺	Emission For K ⁺
1	20	20	22
2	40	36	42
3	60	61	62
4	80	82	81
5	100	100	100
6	Unknown-I(Goda)	23	00
7	Unknown-II(Kal)	22	01
8	Unknown-III(Savitri)	29	02

The development of flame photometric method for the determination of unknown concentration of ions present in pharmaceuticals has been increased considerably in recent years because of their importance in pharmaceutical analysis. The concentration of sodium and potassium present in water sample collected from river was compared against standard solution (concentration in ppm)

of sodium and potassium. Table 1 Graph was plotted on Y axis (Intensity of emission) verses X-axis (concentration in ppm). (Figure 1 and 2) The concentration of sodium and potassium ions present in Goda, Kal and Savitri river is 23 ppm, 22ppm and 29ppm and 00 ppm ,01 ppm and 02 ppm respectively. Concentration of sodium present in the water sample is more than potassium.

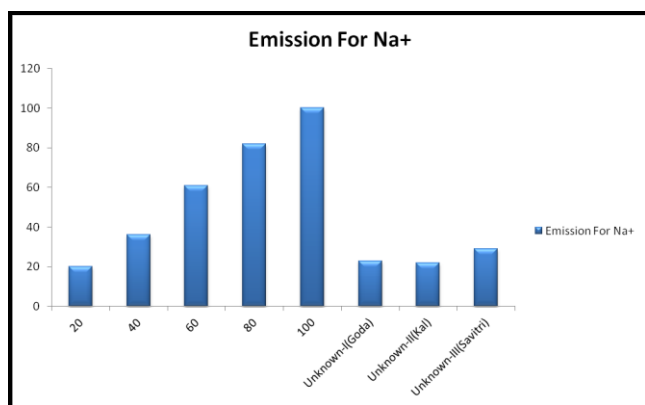


Figure 2: Comparative Graph of Sodium content in standard solution and water sample

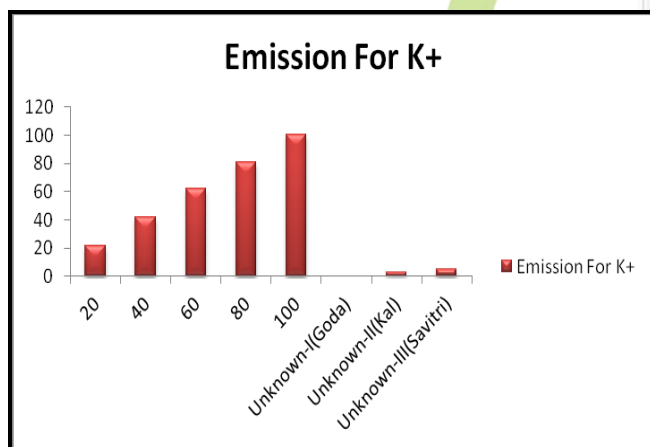


Figure 3: Comparative Graph of Potassium content in standard solution and water sample

CONCLUSION

The obtained statistical information for determination of concentration of sodium and potassium ions in water sample collected from rivers by flame photometric method conclude that concentration of sodium present in the river water sample is more than potassium. With this, we compared above results with WHO guidelines for drinking water and hence it is concluded that

the water of Goda, Kal and Savitri River is potable.

ACKNOWLEDGEMENT

Authors are thankful to college Management and authority for supporting this work.

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