



**Centurion**  
**UNIVERSITY**

*Shaping Lives...  
Empowering Communities...*

# **Experiment No-13: Determination of Na and K content in irrigation water.**

Dr. Arunabha Pal



Centurion  
UNIVERSITY

Shaping Lives...  
Empowering Communities...

## Principle

The Sodium Adsorption Ratio is a ratio of Na concentration in meq/l to the square root of half the concentration of Ca + Mg in meq/l.

$$\text{SAR} = \frac{\text{Na}^+}{\sqrt{\frac{\text{Ca}^{2+} + \text{Mg}^{2+}}{2}}}$$

## Reagents

Sodium solution -0, 5, 10, 15 and 20 ppm

## Procedure

Adjust flame photometer reading to 0 by atomizing 0 ppm Na after placing Na filter opposite air-propane blue flame, and then atomize 20 ppm Na solution and adjust flame photometer reading to 100. Repeat atomization of 0 and 20 ppm Na solution, and check the flame photometer reading



Centurion  
UNIVERSITY

Shaping Lives...  
Empowering Communities...

If necessary again adjust the flame photometer reading. Then atomize the intermediate Na standards. Thereafter, atomize to spray water sample diluted 50 to 500 times. If flame photometer reading is found in the range of 0 to 100, note down the flame photometer reading and the corresponding dilution.

### **Calculation:**

Determine Na concentration (ppm), in diluted water sample by the following equation meq Na/lit in water sample = (ppm Na in diluted sample x times of dilution)/23



Centurion  
UNIVERSITY

Shaping Lives...  
Empowering Communities...

# Determination of K content in irrigation water

## Principle

Water sample is diluted and is then atomized to spray in air- propane blue flame of a flame photometer. K ions on gaining energy from the flame begin to dissipate energy in the form of 767 mill micron wave length which is directly proportional to the concentration of

The emission from K is made to pass through K. filter before striking a photocell connected to a galvanometer. The photocell converts light energy into electrical energy which is measured by the galvanometer. The instrument is first calibrated by atomizing K standards and then water sample atomized and K in water sample is determined by reference to a calibration curve.



Centurion  
UNIVERSITY

Shaping Lives...  
Empowering Communities...

## Reagents

Standard potassium solution, 1.0 g K/A. Dissolve 1.9066 g pure dry KCl (AR) in distilled water and dilute it to 1000 ml mark with distilled water. The Concentration of K in this solution is 1000 ppm. Store the solution in polythene bottle.

Standard potassium solution, 0 to 20 ppm. To obtain 0, 5, 10, 15 and 20 ppm K solution, transfer 0 25 50 75 and 10.0 ml of 1000 ppm K solution into Separate 500 ml volumetric flask. Add distilled water to make the volume to 500 ml.

If internal lithium standard is specified by the manufacturer the estimated amount of lithium/500 ml K standard be added to each flask before making the volume to 500 ml mark with distilled water

If interference from metallic cations is anticipated the interfering cations be also added to the K standards in amounts equal to their concentration in the diluted sample test solution prior to making the volume of K standard to 500 ml. Store each standards in 500 ml polythene bottles.



Centurion  
UNIVERSITY

Shaping Lives...  
Empowering Communities...

## Procedure

Operation of the flame photometer. Place K-filter against the burner by rotating the filter disc and then operate the flame photometer as described in Na determination in water sample.

Calibration of the instrument. Atomize 0 and 20 ppm K solution and adjust the flame photometer reading to 0 and 100 respectively. Then atomize the intermediate K standards, and note down the corresponding flame photometer reading.

Preparation of calibration curve for K. On a linear scale graph paper, set flame photometer reading scale on the ordinate and K concentration scale on the abscissa. Then plot flame photometer reading on the ordinate corresponding to K concentration in ppm on the abscissa. Connect flame photometer reading for 0 and Solution by a straight line to obtain the calibration curve for K.

K determination in diluted water sample. Dilute water sample by transferring 4.0,

2.0 & 1.0 ml of water sample into separate 100 ml volumetric flask and dilute each to 100 ml to obtain water sample diluted 25, 50 and 100 times



**Centurion**  
**UNIVERSITY**

Shaping Lives...  
Empowering Communities...

### Calculation:

ppm K in water sample = ppm K in diluted water by reference to calibration curve \*  
dilution times

Meq K/lit in water sample = ppm K in undiluted water sample /  
Equivalent weight of K i.e.  
39.102

K supply from irrigation water in kg K/ha.= meq K/1 irrigation water \*  
3.91 \* Depth of irrigation in cm.

**Observation:** Students must complete your calculation with above formula and write proper result.

Sample No	Na <sup>+</sup> content (ppm)	K <sup>+</sup> content (ppm)
-----------	-------------------------------	------------------------------

	Remark	
--	--------	--

1.		
----	--	--

2.		
----	--	--