Deter. Of (Na^+) in water samples using FAAS

Introduction:

Observation in the 1700s that candlelight changed color when different materials were introduced into a flame prompted studies that revealed that elements emit characteristic colors of light that consist of line spectra. Kirchhoff's laws of Spectroscopy were established in the late 1800s and describe both emission and absorption of light. The observation that atoms of each element can emit and absorb light at specific wavelengths is a fundamental property of matter that rapidly became an analytical tool and contributed to development of structural models of the atom. The theoretical basis and instrument components used for flame emission spectrometry (also called flame photometry) and flame and flameless atomic absorption spectroscopy are described with general comments on sensitivity and susceptibility to chemical, spectral, ionization and matrix interferences. Modern instruments that use flame, electrothermal (or flameless) or inductively coupled plasma designs are flexible, reliable and sensitive and are used in reference laboratories to assess the concentration of trace elements and heavy metals in biological fluids to support medical diagnosis and treatment.

What is/are:

Water from Chemical point of view?

Sodium?

Absorption?

Emission?

FAAS/FES?

The molecule's journey?

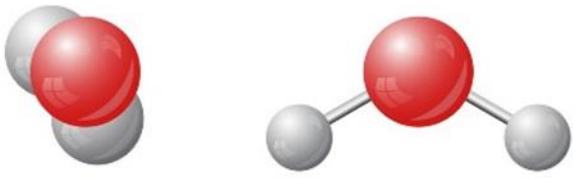
The relation between A & C,l?

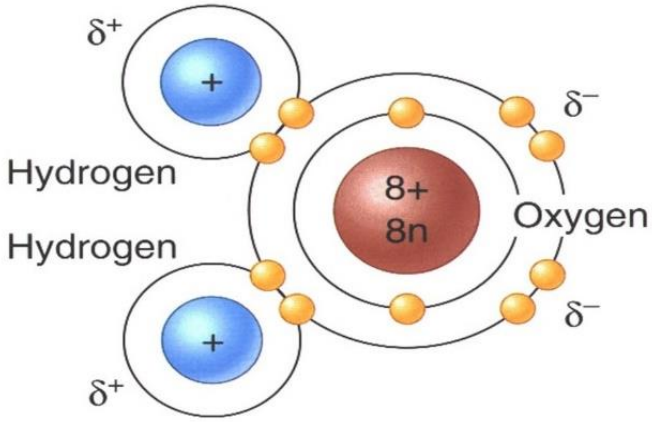
Beer-Lambert's Law?

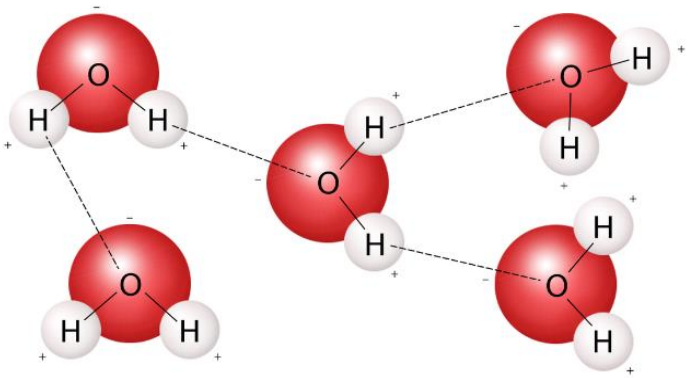
Flame Main Types & Components?

Interferences?

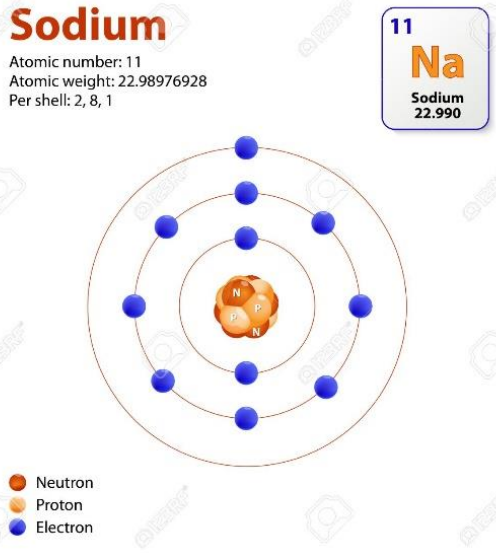
Water from Chemical point of view:





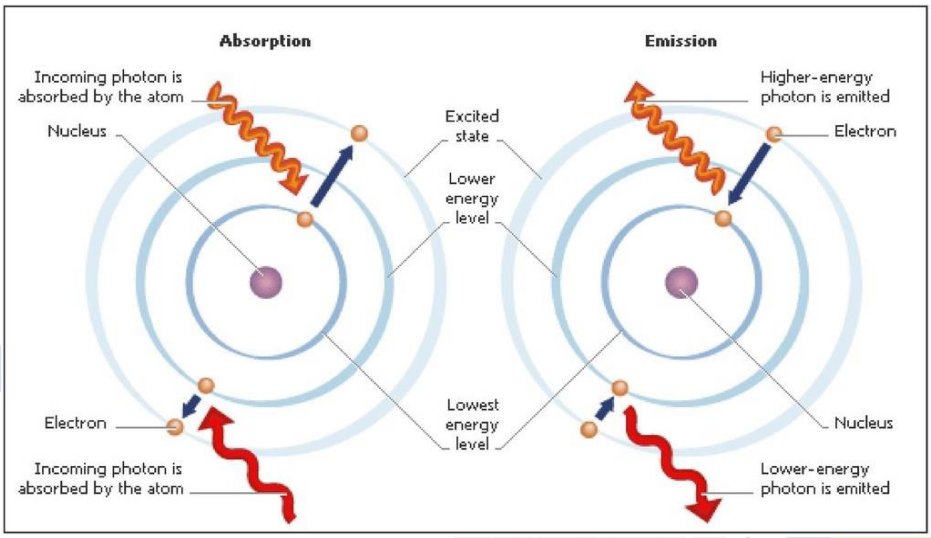


Sodium:



Although sodium is often maligned as a cause of high blood pressure, it also plays several essential roles in the body. Sodium helps control blood pressure and regulates the function of muscles and nerves, which is why sodium concentrations are carefully controlled by the body. However, most people consume far more sodium than their bodies need.

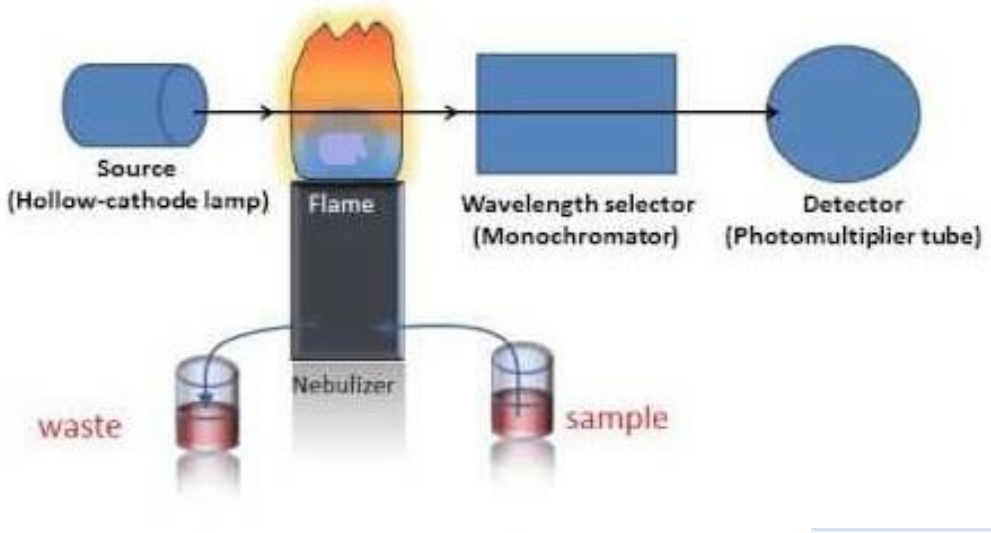
Absorption & Emission:



Absorption refers to how much light (or other waves) can be taken in by the material being measured.

Emission refers to how much light (or other waves) can be released by the material being measured.

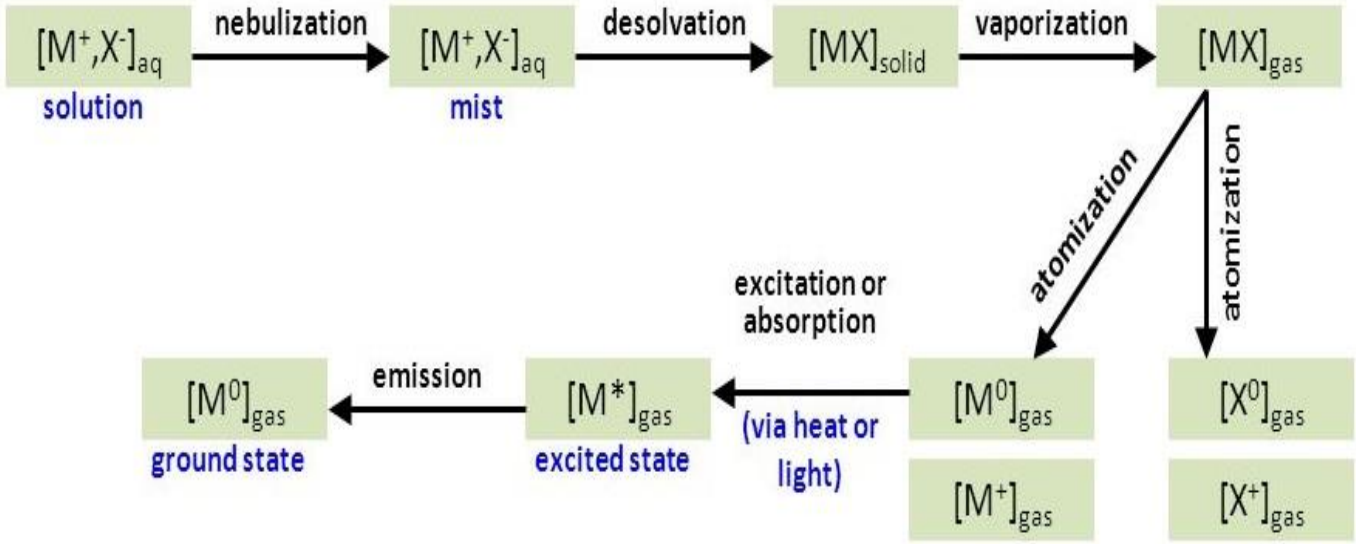
FAAS/FAES:



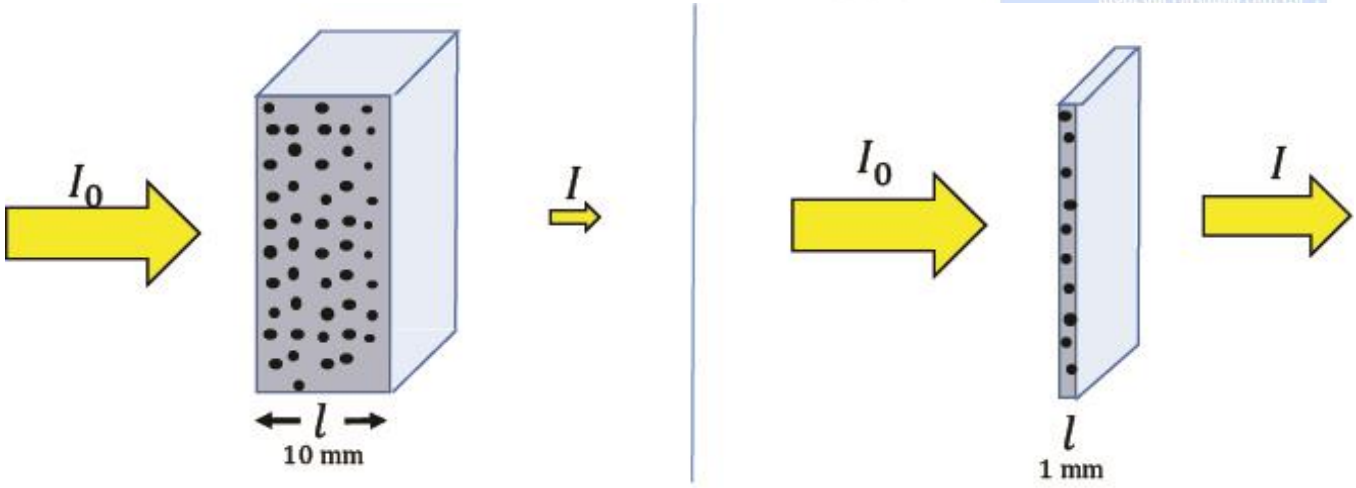
Atomic Absorption Spectrophotometry (AAS) is used to determine the concentrations of individual elements in a sample by measuring the selective absorption of light by gaseous atoms produced by spraying a solution into a flame.

Atomic Emission Spectroscopy (AES) uses quantitative measurement of the optical emission from excited atoms to determine analyte concentration. Analyte atoms in solution are aspirated into the excitation region where they are desolvated, vaporized and atomized by a flame to promote the atoms into high energy levels. The atoms decay back to lower levels by emitting light.

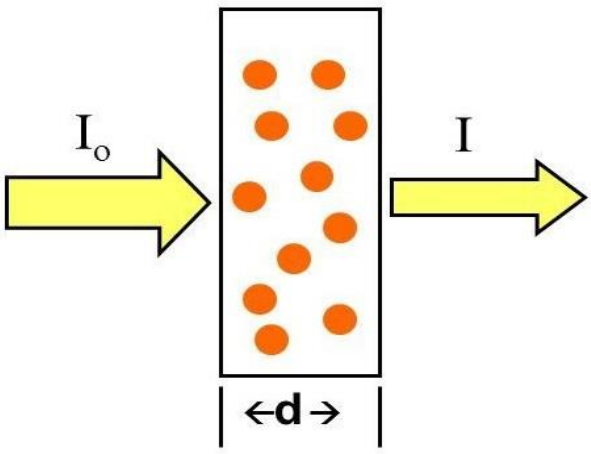
The molecule's journey:



The relation between A & C,l:



Beer–Lambert's Law:



$$I = I_0 10^{-\varepsilon \ell c}$$

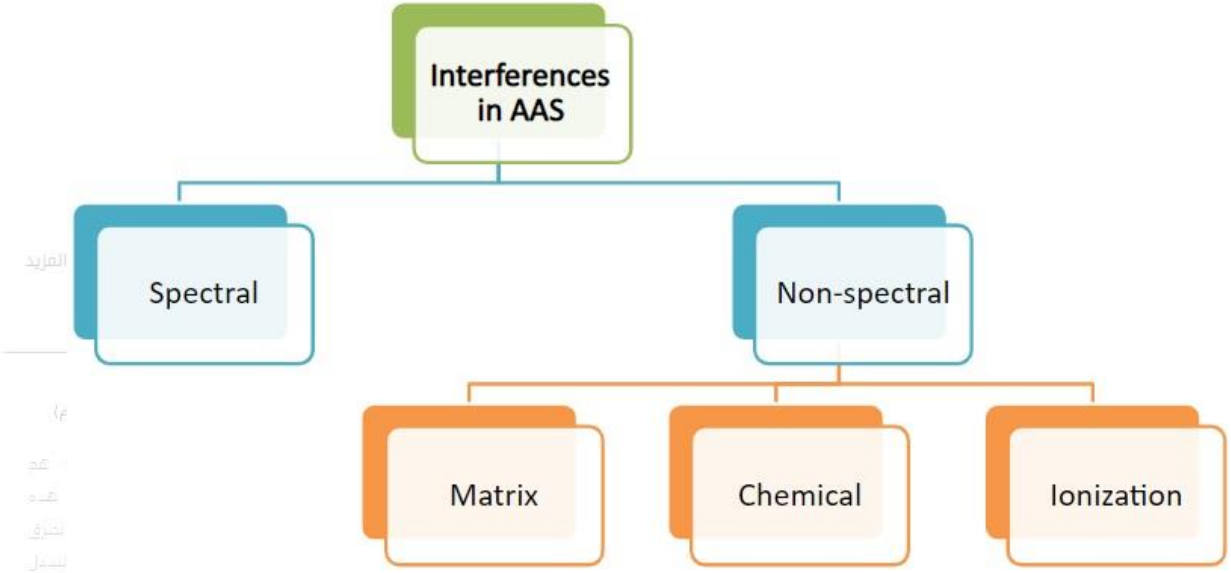
I = light intensity
ε = extinction coefficient
ℓ = thickness
c = concentration

$$\text{Absorption (A)} = -\log(I/I_0) = \varepsilon \ell c$$

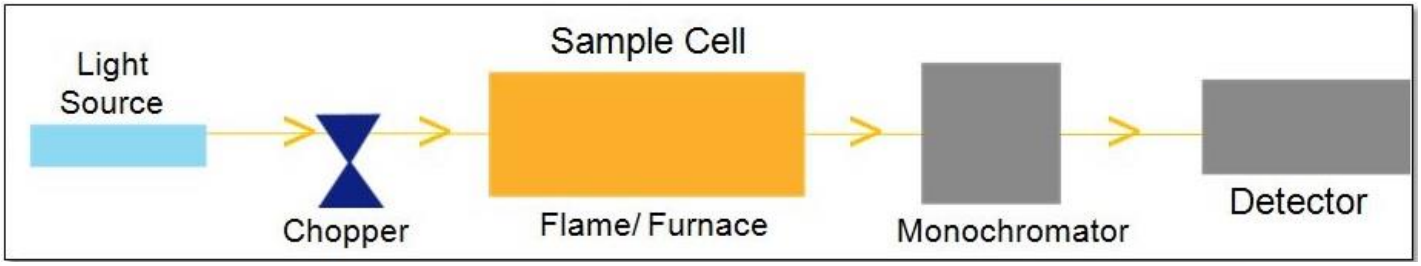
Flame Main Types & Components:

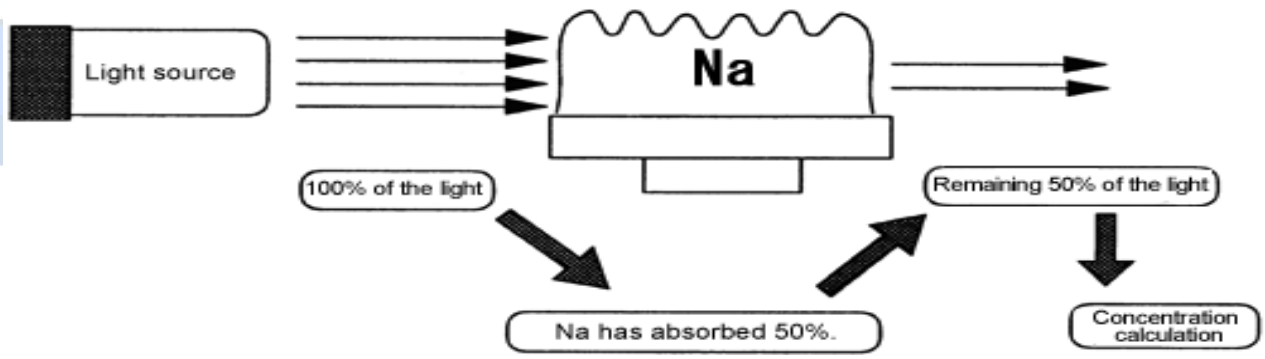
OXIDANT	FUEL	TEMPERATURE, C
Oxygen	Natural Gas	2700-2800
Oxygen	Hydrogen	2550-2700
Oxygen	Acetylene	3050-3150
Air	Natural Gas	1700-1900
Air	Hydrogen	2000-2100
Air	Acetylene	2100-2400
Nitrous Oxide	Acetylene	2600-2800

Interferences:



Instrument:





Experimental:

1- Prepare 100ml Of [100ppm] of (Na^+) from (NaOH) using distilled water.

2- Prepare next (all in 50ml Volumetric flasks):

NO	1	2	3	4	5	Blank	Tap Water	Bottled Water
50ml								
Na^+ (ppm)	4	8	12	16	20	NIL	NIL	NIL

3- Fill all above flasks ([1-5] + Blank **only**) with distilled water.

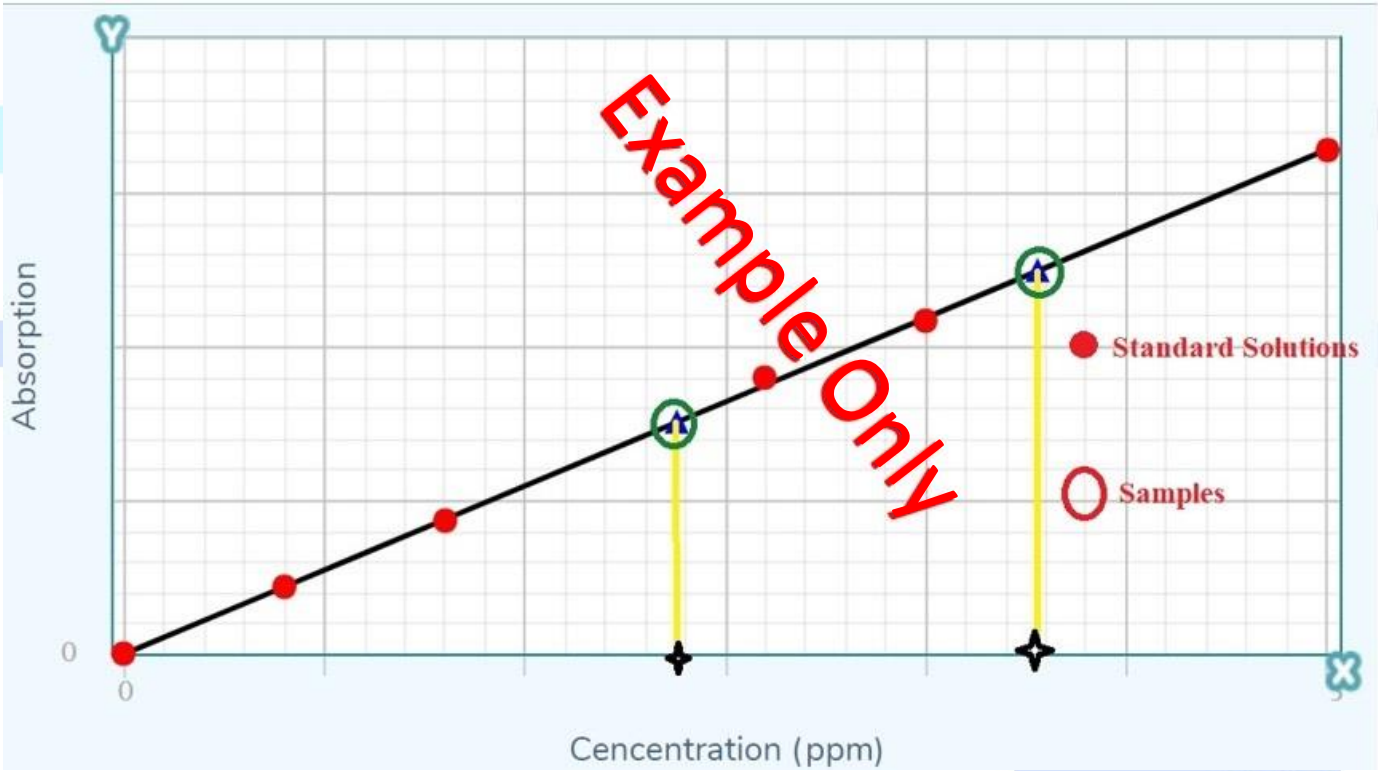
4- Deal with BOTH samples directely.

5- Move to the next Laboratory and follow given instructions to Find the concentration of (Na^+) in both samples, Compare results and Calculate (% Compatibility).

Results (1):

No.	$C_{(ppm)}$	Absorbance
Blank	NIL	0
1	4	A_1
2	8	A_2
3	12	A_3
4	16	A_4
5	20	A_5
Bottled Water	?	A_{unk1}
Tap Water	?	A_{unk2}

Calibration Graph:



Results (2):

- Na^+ Concentration in Tap water =
- Na^+ Concentration in Bottled water =
- Na^+ Published Concentration in Bottled water (Trade Name)=
- % Compatibility between Published & Found Na^+ Concentration in Bottled water =

Results Comparison:

Conclusion: