1. Scope and Objectives

To determine the quantity of iron present in the water.

2. Principle

It is based on the reaction of iron in ammonical (Ammonia reacts with iron forming a Complex) solution with thioglycolic acid which forms pink to deep reddish purple coloured complex of iron thiogluconate which is stable in absence of air but fades in air due to oxidation. Thyoglycolic acid also reduces ferric ions.

(*Note: - Although, the phenanthroline method is the preferred standard procedure for the measurement of iron in water except when phosphate or heavy metal interferences are present. Kathmandu Valley has water sources of phosphate interferences so thioglycolic acid method is chosen for uniformity.*)

3. Equipment and Materials

A. Microprocessor 1312 Photo Colorimeter
B. Glassware like conical flasks, pipettes and glass beads.

4. Reagents

1. Hydrochloric acid
2. Thioglycolic Acid
3. Ammonia Solution
4. Stock iron solution
5. Standard iron solution (1 mL = 10 µg Fe)

5. Procedure

A. Standard Preparation and Sample Preparation

a. Prepare a Series of standard solutions in a 50ml Volumetric Flask.
b. Pour those standards to a clean 250ml conical flasks.
c. Add 1 mL HCLsolution

d. Heat those standards to the boiling point and let it reduce to half.

e. Let those standards cool down in waterbath.

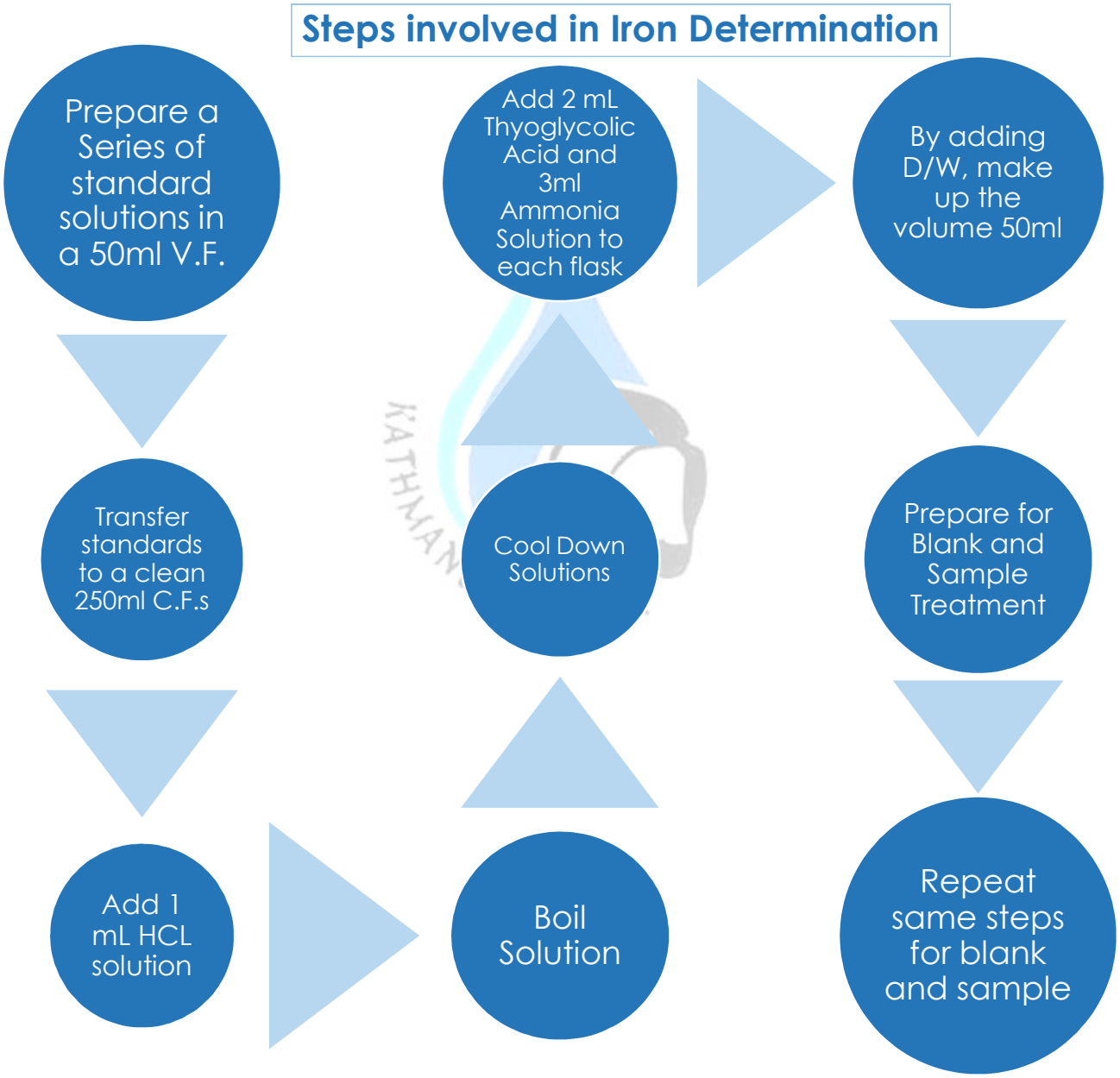
f. Add 2 mL Thyoglycolic Acid to each flask.

g. Add 3ml Ammonia Solution.

h. Make up the contents of each flask exactly to 50mL by adding distilled water

i. Take 50 mL distilled water for blank and 50ml sample in another conical flask

j. Repeat steps 2 to 5 described above for sample treatment and blank.



B. Instrumentation

1. Switch on the instrument by pressing the power button of an instrument.
2. Put blank (distilled or deionized water) in a test cuvette and place in universal holder.
3. Set function switch to ABS.
4. Put blank (distilled or deionized water) in a test cuvette and place in universal holder.
5. Adjust ZERO ABS for a reading of 00.0 absorbance

Or

1. Switch on the instrument by pressing the power button of an instrument.
2. Set function switch to %T.
3. Put blank (distilled or deionized water) in a test cuvette and place in universal holder.
4. Adjust 100% T for a reading of 100.0%.
5. Place sample to be measured in holder, readout will display transmittance of sample in direct %.

6. Measure the absorbance or Tansmittance of each solution in a Colorimeter at 520 nm.

6. Precision and bias

There may be interference of other metal cations which forms is eliminated by using citric acid which forms a complex with other metal cations so duplication of the measurement is recommended.

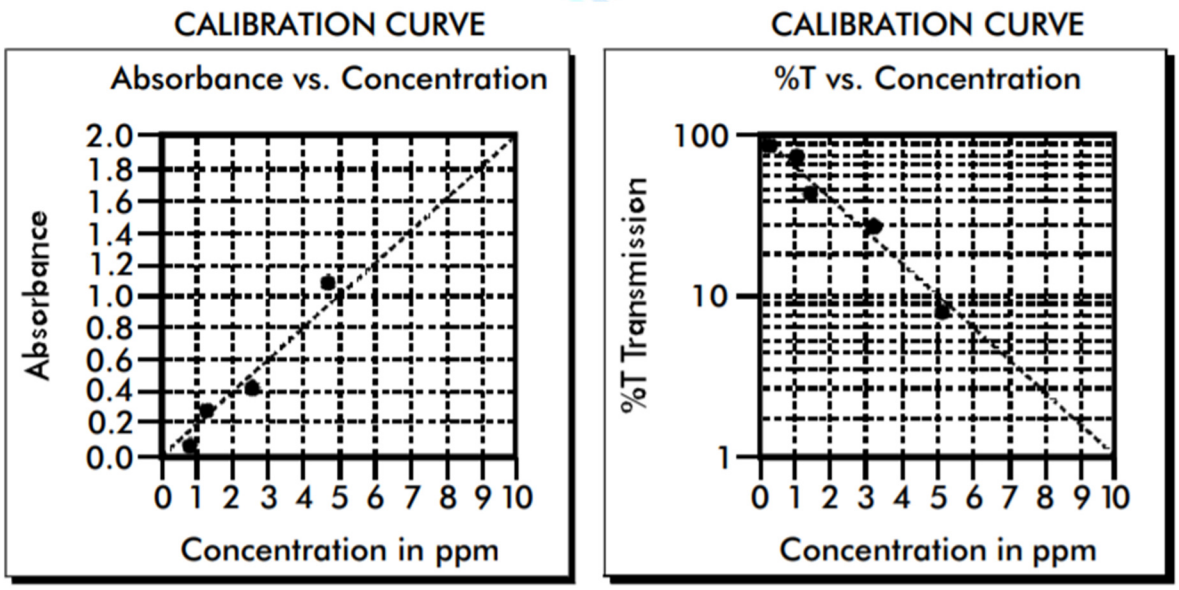
Measured random standard and sample containing iron to check the precision.

7. Calculations

Concentration can be determined from either transmittance or absorbance readings by constructing a calibration curve.

1. Prepare a calibration graph taking meter reading on y-axis and concentration of iron on x-axis.

2. Read off the conc. of iron (mg Fe) from the calibration graph for the corresponding meter reading.



9. Maintenance

- ⚠ WARNING: Ensure the unit is disconnected from the mains electricity supply before attempting maintenance or servicing.
- The only maintenance required is to clean the external surfaces with a damp cloth

- To give added protection when not in use the unit should be disconnected from the mains supply and covered with the optional dust cover

10. References

- ❖ APHA Standard Method
- ❖ Microprocessor 1312 Photo colorimeter Manual

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