AQUASOL

Analyzing Waters... Anytime... Anywhere...

- EASY TO FOLLOW PROCEDURES
- COMPACT
- PORTABLE
- BASED ON PROVEN METHODS
- ACCURATE
- BACKED BY SOUND CHEMICAL RESEARCH
- ECONOMICAL
- RAPID
- RELIABLE

AE 103
DRINKING WATER

RAKIRO

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DRINKING WATER TEST KIT

Water is vital for survival, not only for humans but for all living things. Hence it's quality is of prime importance to maintain good human health. Therefore it is essential that the quality of water is ensured according to standards laid down by National and International agencies.

The Physical, Chemical & Microbiological properties should be tested periodically for achieving the above.

The Bureau of Indian standards (BIS) has laid down Standards for Drinking Water parameters in IS : 10500 – 1991. Some of the important parameters monitored frequently have been listed here. (Vide end of this Booklet for reference.)

These parameters are tested in the laboratory by conventional techniques.

Now these same techniques have been simplified into easy to use readymade testing systems, which afford testing of drinking water at the point of source. These mobile laboratories are available, complete with reagents and accessories for testing on site.

The testing systems are user friendly and have been designed keeping in mind non technical personnel. The instructions given are simple and if followed properly would ensure reliable results.

MEASUREMENT OF PARAMETERS

The various parameters to be tested for Drinking water have been selected by taking into account the most common parameters monitored most frequently. The methods of analysis are Drop Titration & Colour Comparison.

The parameters are :

1.	pH	4, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9,10
2.	Turbidity	1, 5, 10, 20, 25 as NTU
3.	Total Hardness	10–200 & 50–1000 mg/l as $CaCO_3$
4.	Chloride	10–200 & 50–1000 mg/l as Chloride
5.	Free chlorine	0.1-2.0 mg/l as Chlorine
6.	Dissolved Iron	0.05, 0.1, 0.3, 0.4, 0.7, 1.0, 1.5, 2.0 mg/l as Fe
7.	Fluoride	0.1–2.0, mg/l as Fluoride
8.	Nitrate	0.5, 1.0, 2.5, 5, 7.5, 10, 20, 30, 40, 50 mg/l as NO_3
9.	Alkalinity	10–200 & 50–1000 mg/l as $CaCO_3$

GENERAL INSTRUCTIONS

1) The testing area should be sufficiently clean.
2) All reagents bottles & other accessories are to be used according to the directions given in the procedure cards.
3) By following the directions given in the procedure cards carefully, correct values will be obtained.
4) While using powder reagents, take care to use dry spoon and close the powder dubbies immediately after use.
5) While doing ' Drop titration' tests, please read directions on reagent bottles/ dubbies carefully.
6) While doing Colour comparison tests observe the Developed colour in sufficient light and according to directions given in the procedure card, carefully match the colour.
7) After the test is completed, clean and dry all reagent bottles and accessories and place them in their respective position.

PRECAUTIONS

This system contains chemical reagents. Although these have been packed in leak proof containers with labels, it is necessary to take precautions while using them.

The following precautions are to be followed:

1) Avoid contact of skin and eyes with chemical reagents.
2) Hands are to be washed after doing each test.
3) Take care not to mix the different chemicals in the bottles. Keep the labels of each reagent dry, clean & intact. Do not keep bottles open.
4) Replace the caps of each bottle as soon as the contents have been used.
5) Keep Colour Charts away from water, heat and direct sun light. Keeping them in dry places is preferable.
6) Do not spill reagents on charts.
7) Take necessary precautions during use of reagents. If any reagent spills on any body part, wash immediately with plenty of running water. If required seek medical help at the earliest.

AE-103 - DRINKING WATER COMBINATION KIT

REAGENT KEY

TH1S	CD1	AK4	FD3	Accessories	FE3	-	HNT1	HNT3
TH2	TH5	TH6	-		FE1	FE2	-	FC1
CD2	CD3	CD4	-		FD1	FD2A	FD2B	FD4L
-	AK2	AK3L	PH1		FC2	HNT2	-	-

pH

Colour Comparison Method

Range : 4, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 10

Directions for use :

1) Fill the test jar with the water sample upto 10ml the mark.
2) Add 10 drops of PH1 and mix well.
3) Place the test jar in the Comparator slot.
4) Read the pH as follows.
   a) Place the test jar on the inner circle of the colour comparison chart
   b) View from to of test jar to match the colour to the colour shade.
   c) Read the pH value corresponding to the colour shade.

TURBIDITY

Colour Comparison Method

Range : 1, 5, 10, 20, 25 NTU.

Direction for use :

1. Shake vigorously the water sample to be tested.
2. Pour the well shaken sample in test jar upto 25 ml mark.
3. Read the NTU Turbidity as follows:
   a) Place the sample tube on the small inner black circle on the comparison chart.
   b) View from the top of the comparator tube and compare the shade of the Turbidity of the sample with different shades.
   c) Read the NTU Turbidity from the chart after arriving at the correct match.

* For controlled addition of drops,follow instructions on the dispenser.

TOTAL HARDNESS

PROCEDURE -I

Range : 10 – 200, ppm Hardness as ppm $CaCO_3$

Directions for Use :

1. Take 25 ml of water sample to be tested in the test jar.
2. Add one spoonful (provided herewith) of **TH 1S**.
3. Mix contents well to dissolve.
4. Add 10-12 drops* of **TH 2** and mix contents well.
5. If colour turns blue, it indicates there is 'No Hardness' in the water.
6. If colour turns red, it indicates there is 'Hardness'.
7. Now drop wise add **TH5**, counting the number of drops while mixing, until the colour changes from red to blue.

Calculations :

Total Hardness as ppm $CaCO_3$ = 10 X Number of drops of **TH 5**

* For controlled addition of drops, follow instructions on the dispenser.

TOTAL HARDNESS

PROCEDURE-II

Range : 50 – 1000, ppm Hardness as ppm $CaCO_3$

Directions for Use :

1. Take 10 ml of water sample to be tested in the test jar.
2. Add one spoonful (provided herewith) of **TH 1S**.
3. Mix contents well to dissolve.
4. Add 10-12 drops* of **TH 2** and mix contents well.
5. If colour turns blue, it indicates there is 'No Hardness' in the water.
6. If colour turns red, it indicates there is 'Hardness'.
7. Now drop wise add **TH6**, counting the number of drops while mixing, until the colour changes from red to blue.

Calculations :

Total Hardness as ppm $CaCO_3$ = 50 X Number of drops of **TH6**

* For controlled addition of drops, follow instructions on the dispenser.

CHLORIDE

Range : 10 – 200 , 50 – 1000 & upto 2000 ppm Chloride

Directions for Use : (10 - 1000 PPM)

1. Take 10 ml. of water sample to be tested in the test jar.
2. Add one spoonful (provided herewith) of **CD1**. Mix well to dissolve.
3. Then add **CD2** drop by drop till the sample turns yellow.
4. Now drop wise* add **CD3**#, counting the number of drops while mixing, until the colour changes from yellow to bluish violet.

If the expected chloride of the sample is more than 200 ppm, then use **CD4** instead of **CD3**.

Calculations :

Chloride as ppm Cl = 10 x (Number of drops of **CD3**)
= 50 x (Number of drops of **CD4**)

Directions for Use : (Above 1000 PPM)

1. Take 5 ml. of water sample to be tested in the test jar.
2. Add 5ml of DM water (free from chloride) and mix well.
3. Add one spoonful (provided herewith) of **CD1**. Mix well to dissolve.
4. Then add **CD2** drop by drop till the sample turns yellow.
5. Now drop wise* add **CD**4, counting the number of drops while mixing, until the colour changes from yellow to bluish violet.

Calculations :

Chloride as ppm Cl = 100 x (Number of drops of **Cd4)**

* For controlled addition of drops, follow instructions on the dispenser.

FREE CHLORINE

Range : 0.1 – 2.0 ppm Free Chlorine

Directions for Use :

1. Take 10 ml. of water sample to be tested in the test jar.
2. Add one spoonful (provided herewith) of **FC 1**
3. Mix contents well to dissolve.
4. If a pink colour does not develop, chlorine is not present.
5. If a pink colour appears, free chlorine is present.
6. Now drop wise* add **FC 2** counting the number of drops while mixing, until the pink colour disappears.

Calculations :

Free Chlorine as ppm Chlorine = 0.1 X No. of drops of **FC 2**

Important :

- After the end point (colourless) has reached, if a pink colour reappears on keeping, it should be ignored.
- Since the **FC 1** reagent is sensitive to air, close the lid of the **FC1** bottle immediately after the use.

* For controlled addition of drops, follow instructions on the dispenser.

DISSOLVED IRON

Colour Comparison Method

Range : 0, 0.05, 0.1, 0.3, 0.4, 0.5, 0.7, 1.0, 1.5, 2.0 ppm Iron as Fe

Directions for Use :

1. Take 5 ml of water sample to be tested in the test jar.
2. Add 15 drops of **FE1** and 30 drops of **FE2** and mix the contents thoroughly.
3. Add one spoonful (provided herewith) of **FE3** and mix the contents thoroughly by swirling the test jar and let the mixture stand for 10 minutes.
4. Transfer the content in small comparator tube provided here.
5. Read the ppm Iron as follows :
   a) Place the comparator tube on the inner white circle, of the colour comparison chart.
   b) View from the top of the comparator tube to compare the sample colour and the colour around.
   c) Read the ppm IRON as Fe after arriving at the correct match.

Note : Sample pH should be preferably neutral. Neutralize the sample to phenolphthalein end point before testing by using dilute acid or alkali.

- In case of water sample having colour tint, do the following:

1. Take the original water sample in the comparator tube and read the ppm IRON as per the procedure in No. 5 above.
2. This ppm reading has to be subtracted from the reading of the tested sample.

* For controlled addition of drops,follow instructions on the dispenser.

Nitrate

Range : 5, 10, 20, 40, 80,160 ppm as No_3

Procedure :

1) Take 5 ml of water sample to be tested in the test jar.
2) Now add one spoonful of HNT1, shake well. Keep for 5 minutes, while shaking intermittently. *(Please note that HNT1 powder may not completely dissolved few particles may remains undissolved however ,it will not effect the result)*
3) To this now add three drops of HNT2.Mix well. Keep for three minutes, while shaking intermittently.
4) Now add one spoonful of HNT3. Shake well. Wait for 5 minutes to allow maximum colour development.
5) Dilute to 25 ml mark with DM water and transfer the content in small comparator tube provided here.
6)Read the ppm Nitrate as follows :
   a. Place the comparator tube on the inner white circle, of the colour comparison chart.
   b. View from the top of the comparator tube to compare the sample colour and the colour around.
   c. Read the ppm NITRATE as NO3 after arriving at the correct match.

Note: it is necessary to clean the test tube using soap and with the help of brush (provided) it is important that surface of test tube should be clean prior to testing.

* For controlled addition of drops, follow instructions on the dispenser.

FLUORIDE

Range : 0.1–2.0 ppm Fluoride as F

Directions for use :

1) Take 10 ml of filtered water sample in the glass test jar, provided.
2) Add 1 drops of **FD1**. Mix well. If a yellow colour does not appear, then add **FD 2a** dropwise* till you get yellow colour.
3) Now Add **FD 2b** till the solution becomes colourless. Now add 5 drops more of **FD2b**.
4) Now add 1 spoons of **FD3** powder. Mix well to dissolve. If colour changes to yellowish orange, then Fluoride is absent in the water. If yellow colour persist then Fluoride is present.
5) Now drop wise add **FD4L**, counting the number of drops while mixing until the colour changes from yellow to light pink (peach) colour.
6) Observe this colour change against a white background held below the test jar.

Calculations :

Fluoride as ppm F = 0.1 X No. of drops of **FD4L.**

* For controlled addition of drops, follow instructions on the dispenser.

ALKALINITY

Range : 10–200 & 50–1000 ppm Alkalinity

Directions for Use :

1. Take 10 ml of water sample to be tested in the test jar.
2. Add one spoonful (provided herewith) of **AK 4**. Mix to dissolve. The sample will turn green.
3. Now drop wise* add **AK 2** counting the number of drops while mixing, until the colour changes from green to reddish violet.

Note : If the expected Alkalinity is more than 200 ppm, then use **AK 3L** instead of **AK 2**.

Calculations :

Total Alkalinity ppm as $CaCO_3$

= 10 X (Number of Drops of **AK 2**)

= 50 X (Number of Drops of **AK 3L**)

* For controlled addition of drops, follow instructions on the dispenser.

DRINKING WATER SPECIFICATION (IS : 10500 – 1991)

Sr. No.	Substance or Characteristic	Requirement (Desirable limit)	Undesirable Effect Outside the Desirable limit	Permissible limit in the absence of Alternate source
1.	**pH**	6 .5 to 8. 5	Beyond this range the water will affect the mucous membrane and / or water supply system	No relaxation
2.	**Turbidity** NTU max	5	Above 5 consumer acceptance decreases	10
3.	**Total Hardness** as $CaCO_3$ mg / l	300	Encrustation in water supply structure and adverse effect on domestic use	600
4.	**Chloride** as Cl mg/ l	250	Beyond this limit taste , becomes unpleasant	1000
5.	**Iron** as Fe mg / l	0. 3	Beyond this limit taste, appearance gets affected, has adverse effect on domestic use and water supply structure, and promotes iron bacteria.	1. 0
6.	**Residual, Free Chlorine** mg / l	0. 2	---	---
7.	**Nitrate** as No_3 mg / l	45	Beyond this methaemoglobinemia takes place	---
8.	**Fluoride** as F mg / l	1. 0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis	1. 5
9.	**Alkalinity** $CaCO_3$ mg / l	300	Beyond this limit taste becomes unpleasant	600

Aquasol Combi Kits : Application in Different Water Systems

Water Systems	Industries	Applications	Parameters
Boiler	Pulp & Paper, Textile, Steel, Chemical Manufacturing Units, Fertilizers, Refineries, Sugar, Thermal Power, Feed Water,	Raw Water, Softener, Blowdown Water,	Total Hardness, Calcium Hardness, Alkalinity, pH, Silica, Phosphate, Tannin, Iron, Chloride, Sulphite,
Cooling Systems	Pulp & Paper, Textile, Steel, , Chemical Manufacturing Units, Fertilizers, Sugar, Refineries, Thermal Power Stations, Engineering Units	Make-up Water, Recirculating Water, Basin Water	Total Hardness, pH, Chloride, Alkalinity, Calcium Hardness, Silica, Free Chlorine, Nitrite, Phosphate/Phosphonate, Zinc, Molybdate
RO Water	Industries having Reverse Osmosis (RO) Plants	Feed Water and Permeate Water	pH, Total Hardness, Calcium Hardness Silica, Sulphate, Iron (Low Level), Nitrate, Nitrite (Low Level)
Swimming Pool	Hotels & Resorts, Houses	Monitoring of Pool Water	pH, Free Chlorine
Metal Working Fluid	Engineering Units	Process / D. M. Water	Total Hardness, Chloride, pH
Potable Water	Universal	Drinking Water	Total Hardness, Alkalinity, Chloride, Fluoride, Sulphate, Calcium Hardness, Nitrite, Nitrate, Free Chlorine, pH
Purified Water	Pharmaceuticals	Purified Water	Acidity, Alkalinity (pH), Calcium, Chloride Magnesium, Ammonium, Sulphate, Heavy Metal as Pb,
Aqua Culture	Fishery	Ponds	pH, Ammonia, Nitrite, Nitrate