HUERISTIC DEVICES

Good measures

HD FLIP
USER MANUAL

Version 1.1

Hueristic Devices

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Contents

1 Before you begin

Before you start testing , you need to:

Clean the apparatus (measuring tubes and testing chambers) with distilled water.

Dispose any rinse off as well as excess/ leftover solutions into the jar of activated charcoal that has been provided for safe disposal

Keep tissue paper at the ready so that you can wipe the testing chamber dry as well as clean up any excess spillage

2 What your HD Flip Drinking water test kit should contain

- Reagents
- Distilled water
- Jar of activated charcoal
- 15ml measuring tubes
- 50ml measuring tubes
- Funnel
- Filter Paper
- Sample bottle
- Testing chambers (Borosil and PVC)
- Titration solution
- Calibration solutions
- Light Box
- Color Cards

3 Testing with HD Pro Water app

3.1 Sample Filtration

This step is only necessary for colorimetric tests if the sample water is too turbid. Do not filter samples for turbidity tests

1. Take the sample bottle provided and fill it with the sample to be tested
2. Take the filter paper and fold it as illustrated in Fig 1 at the end of the manual
3. Insert the folded filter paper into the funnel
4. Take a 50 ml test tube and insert the funnel + filter paper into the test tube
5. Slowly pour ample amount of sample water over the funnel into the test tube
6. Wait for 10-15 minutes for the sample water to be properly filtered
7. Your filtered sample is ready for testing

3.2 Standard Testing Procedure

Before testing for any parameter, please make sure you remember to:

- Rinse your apparatus with your water sample before beginning a test
- Dispose any rinse off as well as excess/ leftover solutions in the jar of activated charcoal/sponge that has been provided for safe disposal

The standard testing procedure for all tests is almost the same. The variables are marked in * and specified in the tables at the end of the manual.

3.2.1 Titration Procedure:

*Refer to the Table of Variables at the end of the manual **3.1.1** for variations in measurements.*

1. Measure out exactly the required amount* of your sample in a 15 ml measuring tube.
2. Pour this solution into the testing chamber

3. Add the required amount of reagent(s)*

4. Shake well to ensure proper mixing of reagents

5. Add the titration solution for the parameter you are testing for drop by drop, counting the number of drops you have added till the sample solution undergoes the intended colour change*

6. Open the HD Pro app

7. Scan the barcode provided in last pages of the manual

8. On successful scan, you willl directly be directed to a form (Users should be connected to the internet for this to happen) or Click on the “Get Blank Form” option to download the assigned forms.

9. Click on your respective project name to get the customised form

10. The form should now be downloaded. On the home screen, click on "Fill Blank Form" and select the form to start the test survey and tests

11. If you do not see the parameter you are testing for on the screen, click on the ‘Next’ button at the bottom right corner of the screen to see the other test parameters as the form progresses

12. Click on the parameter name in the form to start the test

13. Enter the number of drops of titration solution used

14. Click on the ‘Enter’ button on your keyboard

15. Your result will be displayed on the screen

3.2.2 Colorimetric Test Procedure:

Calibration
Calibration is the process of teaching your phone to relate colour intensity to the quantity of the parameter being tested. Calibration influences the quality of test results that are based on it. There is a one point calibration that needs to be performed once with the calibration solution provided before starting any new parameter or when there is a renewal of reagents.

*Refer to the Table of Variables at the end of the manual **3.1.2** for variations in measurements.*

1. Take 5ml of calibration solution (10 ml for Nitrate) in a 15ml measuring tube

2. Add the required* amount of reagent (Same amount as is required while testing)

3. Mix well

4. Pour 5 ml of the solution into the testing chamber

5. Place the testing chamber into the holder in the box

6. Follow steps 6-12 as listed in the titration procedure

12. On the next page click on "Calibrate"

13. Read the instructions on the screen and press "Start"

14. Click on "Start Timer" and wait the required amount of time for the reaction to take place

15. The camera immediately opens up once the specific time is up

16. Point your phone to align the green coloured grid on the screen with your colour card setup as illustrated in the picture at the end of the manual (Fig 1)

17. In case of an error message while calibrating, re-calibrate

18. On successful scanning, you will be hinted at the calibrated point and the color shift

19. Press accept

20. Your phone is now calibrated. You can now begin testing samples

Note: Calibration needs to be done only once for every parameter. The "Calibrate" options changes to "Re-calibrate" when calibration is complete. There is no need for re-calibration before testing every sample.

Testing

*Refer to the Table of Variables at the end of the manual **3.1.2** for variations in measurements.*

1. Measure out 5 ml(10 ml for Nitrate) of your sample in a 15 ml measuring tube.

2. Add the required amount of reagent(s)*

3. Shake well to ensure proper mixing of reagents

4. Pour 5 ml of the solution into the testing chamber

5. Place the testing chamber into the holder in the box

6. Follow steps 6-12 as listed in the titration procedure

7. Click on "Start Test"

8. Read the instructions on the screen and press "Start"

9. On the next page click on "Start Timer"

10. The camera immediately opens up once the specific time is up

11. Point your phone to align green coloured grid on the screen with your colour card setup as illustrated in the picture (Fig 1)

12. Your result will be displayed on the screen

3.2.3 Turbidity and Hazen Units Test Procedure:

Calibration

You are provided with 10, 20 and 30 HU/NTU solutions of Hazen Units (HU) and Turbidity(NTU), and distilled water. You will need to calibrate the phone for all these points before you can begin the tests. 0 HU/NTU = Distilled water.

NOTE: TURBIDITY SAMPLE AND CALIBRATION SOLUTIONS TO BE SHAKEN VIGOROUSLY AND TESTED IMMEDIATELY AFTER SHAKING

To Calibrate: (Eaxmple given with 10 NTU/HU. Follow the smae procedure for 0, 20 and 30 HU/NTU)

1. Take 20 ml of 10 NTU/HU solution in the 50ml tube and shake vigorously for 1-2 minutes

2. Immediately pour 5 - 10ml of the solution into the testing chamber (In case of turbidity, use the blue/black chamber provided)

3. Place the testing chamber in the space provided in the light box

4. Follow steps 6-12 as listed in the titration procedure

5. Click on "Calibrate"

6. You will see a number of standard concentrations(0, 10, 20, 30) on the screen where calibration is required

7. Click on 10 to calibrate for 10 HU/NTU and place the phone on top of the light box

8. Align the camera to the centre of the chamber as illustrated in the last page of the manual (Fig 2)

9. Click on "Analyse"

10. You will hear a number of beeps accompanied by a long beep when the test is complete (Make sure to keep the phone absolutely still on top of the box during the beeping sound)

11. Click on "Accept"

12. Repeat for all points

13. In case of calibration error, redo calibration.

14. Once each point has been calibrated, you will be able to start testing

*Refer to the Table of Variables at the end of the manual **3.1.3** for variations in measurements.*

Testing

*Refer to the Table of Variables at the end of the manual **3.1.3** for variations in measurements.*

1. Take 20 ml of sample solution in the 50ml tube and shake vigorously for 1-2 minutes

2. Immediately pour 5-10 ml of the solution into the testing chamber (In case of turbidity, use the blue/black chamber provided)

3. Place the testing chamber in the space provided in the light box

4. Follow steps 6-12 as listed in the titration procedure

5. Click on "Start Test"

8. Align the camera to the centre of the chamber as illustrated in the last page of the manual (Fig 2)

9. Click on "Analyse"

10. You will hear a number of beeps accompanied by a long beep when the test is complete (Make sure to keep the phone absolutely still on top of the box during the beeping sound)

11. Your result will be displayed on the screen

SCAN TO DOWNLOAD THE FORM

Fig 1: Aligning the cards (Colorimetric tests)

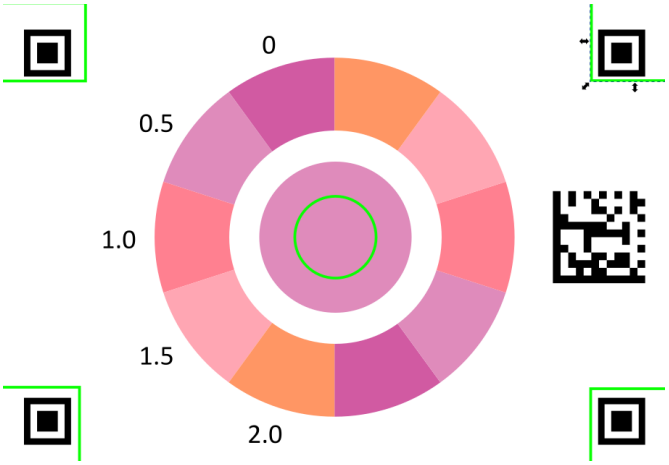
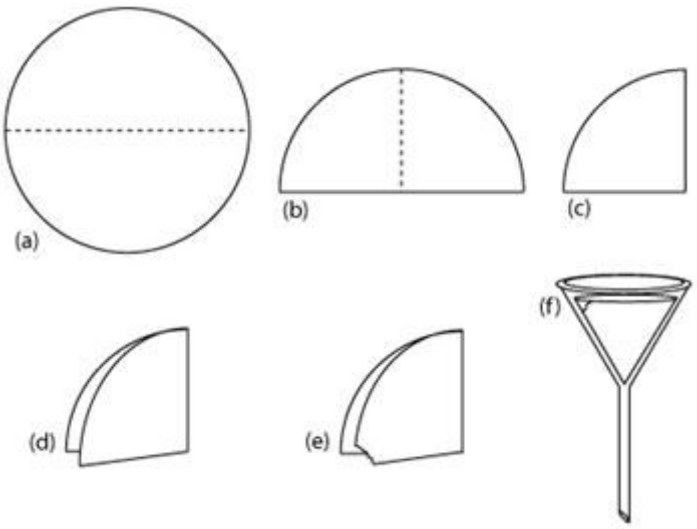


Fig 2: Focusing on the chamber (Turbidity and Hazen Units test)

Fig 3: Folding the filter paper into the funnel (Filtration)



3.1.1 : Table of Variables (Titration Tests)

Parameter	Volume of sample (in ml)	Reagent	Mixing procedure	Color change to look for while adding titration solution
Total Hardness	10	One bottle of reagent A and one bottle of reagent B and one bottle of titrant	Add half spoon of reagent A and 10 drops of reagent B and mix the contents well. Titrate with titrant bottle drop by drop	**Red to Blue**

Total Alkalinity	10	One bottle of reagent A and one bottle titrant	Add 2 drops of reagent A and mix well. -If pink color appears, it indicates presence of p alkalinity. Add titrant drop by drop until the pink color disappears. Note the drops in titration 1 drops. If pink color doesn't appear note '0' in titration 1 drops. - To this solution add half spoon reagent B and solution turns green. Titrate drop by drop with titrant until green turns reddish violet and note the drops in titration 2 drops.	**Colorless to Pink** **Colorless to Green** **Green to Reddish Blue**

3.1.2 : Table of Variables (Colorimetric Tests)

The sample volume, reagent volume and wait time is the same when calibrating and/or testing

Parameter	**Volume of sample (in ml)**	**Reagent**	**Mixing procedure**	**Range limits (in mg/l)**
Fluoride	5	One dropper bottle of Fluoride Reagent	Add **5 drops** of Fluoride Reagent to the sample solution Shake gently 2-3 times	0 - 2

Nitrate	10	One strip of tablets each of Nitrate Reagent A and B	Add **1 tablet of Nitrate Reagent A** and **1 tablet of Nitrate Reagent B** to the sample solution Shake well until tablets have dissolved	0 - 75
Free Chlorine	5	One dropper bottle of chlorine reagent	Add 5 drops of Free chlorine reagent to the sample solution Shake well	0 - 3
Iron	5	One 30 ml dropper bottle Iron A reagent and One 60 ml dropper bottle for Iron B reagent	Add 1 drop of Iron A reagent and Add 5 drops of Iron B reagent to sample solution. Shake gently 2-3 times	0-1.5
pH	5	One dropper bottle of Universal pH indicator	Add **1 drop** of Universal pH indicator to the sample solution Shake gently 2-3 times	4 - 10

3.1.3: Table of Variables (Hazen Units and Turbidity Tests)

The sample volume, reagent volume and wait time is the same when calibrating and/or testing

Parameter	**Volume of sample (in ml)**	**Mixing procedure**	**Range limits (in mg/l)**
Hazen Units	5-10	Take 15-20 ml of the sample or calibration solution till it reaches the brim of the testing chamber	0 - 30
Turbidity	5-10	Take 15-20 ml of the sample or calibration solution till it reaches the brim of the testing chamber	0 - 30