HUERISTIC DEVICES

Good measures

HD FLIP
USER MANUAL

Version 1.1

Hueristic Devices

February 21, 2022

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

Note: Turn on the switch of the light box to illuminate the box before starting any test

2 What your HD Flip Drinking water test kit should contain

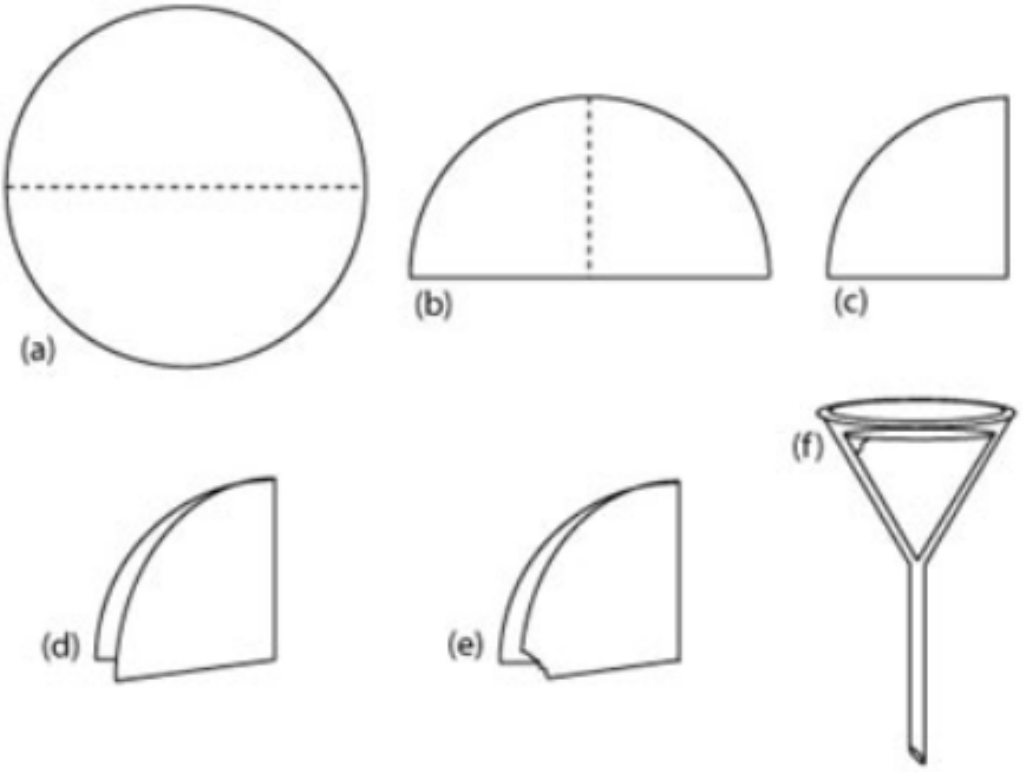
- Reagents
- Distilled water
- Jar of activated charcoal
- 15ml measuring tubes
- 50ml measuring tubes
- Funnel
- Filter Paper
- Sample bottle
- Testing chambers (Borosil and PVC)
- Titration solution
- Calibration solutions
- Light Box with rechargeable battery
- Color Cards

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



3. Insert the folded filter paper into the funnel (f)
4. Insert this Funnel with the filter paper inside into a 50 ml test tube
5. Slowly pour 25-30ml 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

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

3.2.1 Titration Procedure:

Refer to the Table of Variables 3.1.1 below for variations in measurements.

1. Measure out exactly the required amount* of your sample in a 50 ml measuring tube.
2. Add the required amount of reagent(s)*
3. Shake well to ensure proper mixing of reagents
4. Add the titration solution/titrant 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*
5. Open the HD Pro app
6. Scan the bar-code provided

7. On successful scan, you will 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.
8. Click on your respective project name to get the customised form
9. The form should now be downloaded. On the home screen, click on "Fill Blank Form" and select the form to start the test survey
10. 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

11. Click on the parameter name in the form to start the test
12. Enter the number of drops of titration solution used
13. Approve the entry
14. Your result will be displayed on the screen

3.1.1 : Table of Variables (Titration Tests)

Parameter	Volume of sample (in ml)	Reagent	Mixing procedure	Colour change to look for while adding titration solution
Total Hardness	25	One bottle of reagent A and one bottle of reagent B and one bottle of titrant	Add one spoon of reagent A and 20 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 colour appears, it indicates presence of p alkalinity. Add titrant drop by drop until the pink colour disappears. Note the drops in titration 1 drops. If pink colour 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.	**Colourless to Pink** **Colourless to Blue-Green** **Blue-Green to Reddish Blue**

3.2.2 Colorimetric Test Procedure:

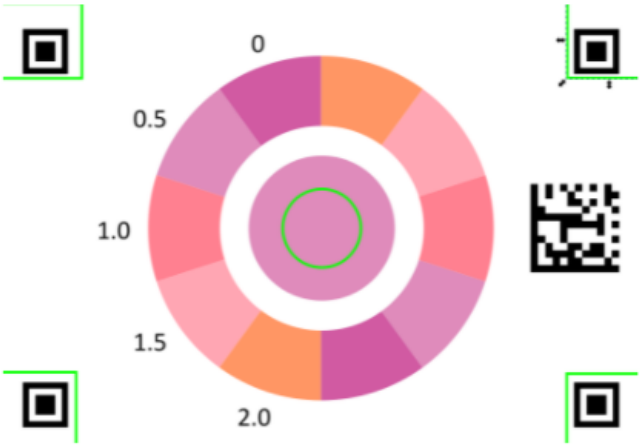
Calibration
Calibration is the process of teaching your phone to relate colour intensity to

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 **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



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

Chlorine Calibration Standards Preparation

To Prepare the 0.2 ppm calibration standard of chlorine:

1. Take 1 ml of the 10ppm Chlorine stock solution provided in a 50 ml test tube

2. Add 49 ml of distilled water to this solution to make it to 50 ml

3. This is your 0.2 ppm chlorine solution that you will use for calibration. Continue testing and calibrating the same way as mentioned above

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.

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

Testing

Refer to the Table of Variables 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
12. Your result will be displayed on the screen

3.2.3 Turbidity and Hazen Units Test Procedure:

Calibration

You are provided with 20, 40, 60 NTU of turbidity and 25, 50 , 100 HU of Hazen Units solutions and distilled water. Using these solutions, you will need to calibrate the phone for all these points before you can begin the tests. (0 HU/NTU = Distilled water).

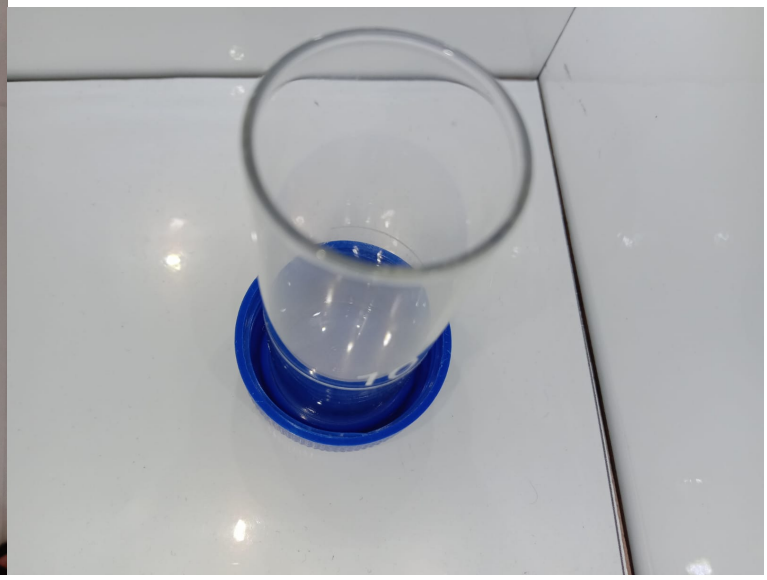
NOTE: TURBIDITY SAMPLE AND CALIBRATION SOLUTIONS TO BE SHAKEN VIGOROUSLY AND TESTED IMMEDIATELY AFTER SHAKING

To Calibrate: (Example given with 20 NTU. Follow the same procedure and complete calibration for all points listed.)

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

2. Immediately pour 20ml of the solution into the borosil glass chamber provided

3. Place the testing chamber in the space provided in the light box (Use blue cap as a background in case of Turbidity)



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

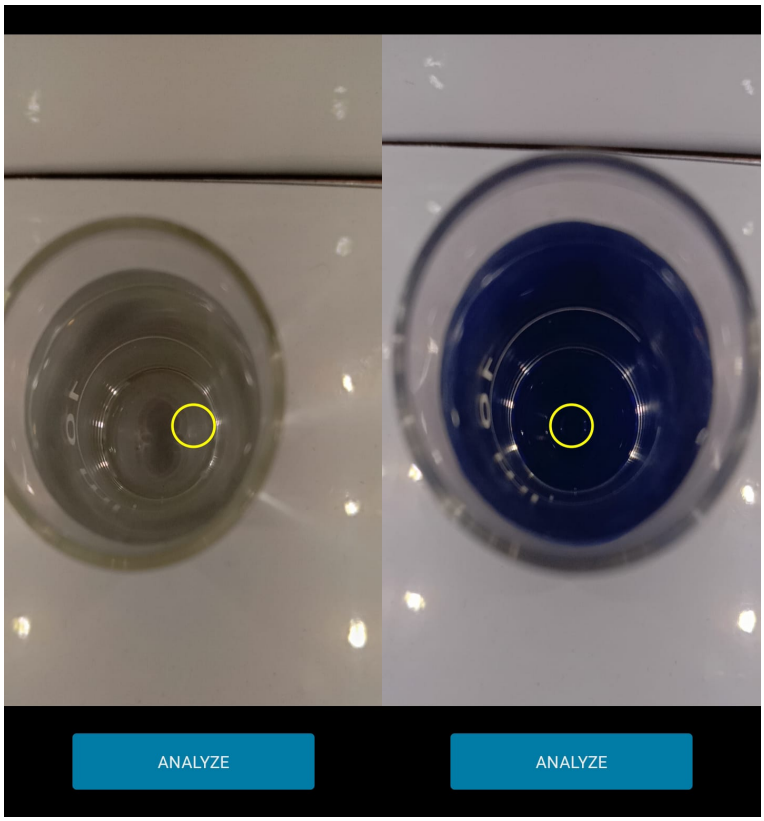
5. You will be prompted that the calibration is not completed and will be taken to a page with the calibration points

6. You will see a number of standard concentrations(0, 20, 40, 60) on the screen where calibration is required

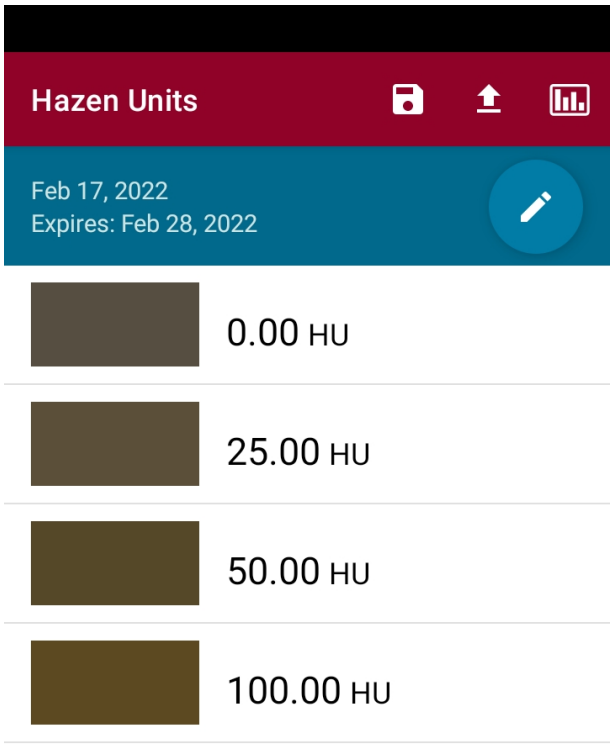
7. Click on 20 to calibrate for 20 HU/NTU and place the phone on top of the light box

8. Next enter the reagent expiration date (2/12/22)

9. Click on "Start Camera" and align the camera to the centre of the chamber in a clear no shadow region for Hazen Units (For turbidity align it to the centre)



10. Click on "Analyse"
11. 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)
12. Click on "Accept"
13. Repeat for all points



14. Once each point has been calibrated, you will be able to start testing *Refer to the Table of Variables 3.1.3 for variations in measurements.*

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	20	Take 20 ml of the sample or calibration solution till it reaches the brim of the testing chamber	0 - 100
Turbidity	20	Take 20 ml of the sample or calibration solution till it reaches the brim of the testing chamber	0 - 60

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 20 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 Camera"
8. Align the camera to the centre of the chamber in a clear no shadow region for Hazen Units (For turbidity align it to the centre as illustrated above)
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

3.2.4 ET and TDS probe provided along with a manual inside the package