Instructional Booklet for Tests in Ops. Lab

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Titrations

1. **Alkalinity** (Raw and Finished Water)
   -Collect 50 ml of sample to be tested in graduated cylinder and transfer to beaker.
   -Add 1 packet of phenolphalein and swirl to mix.
   -Add 6 drops of Bromcresol Green and swirl to mix.
   -Fill buret to zero with .020N Sulfuric Acid.
   -Place beaker under buret and begin to titrate with Sulfuric Acid while swirling beaker.
   -Once the solution completely changes from blue/green to pink/yellow, stop and multiply the given number indicated on buret by 20.
   Ex. Value given once solution changes from blue to pink is 9.5.
   9.5 X 20 = 190ppm. 190ppm is value of alkalinity.

2. **Total Hardness** (Raw and Finished)
   -Collect 50 ml of sample to be tested in graduated cylinder and transfer to beaker.
   - Add 1 packet of total hardness, "Hardness Ind. Calmagite", and swirl to mix.
   -Add 1.0 ml of Buffer solution and swirl to mix.
   -Fill buret to zero with EDTA solution.
   -Place beaker under buret and begin to titrate with EDTA solution while swirling beaker.
   - Titrate until the solution turns from a pink/red to blue. Once solution is blue, multiply the given number on buret by 20 to get your total hardness value.

3. **Calcium Hardness** (Finished)
   -Collect 50 ml of sample to be tested in graduated cylinder and transfer to beaker.
   -Add 1 packet of Calcium Indicator and swirl to mix.
   -Add 1.0 ml of potassium hydroxide and swirl to mix.
   -Fill buret to zero with EDTA solution.
   -Place beaker under buret and begin to titrate with EDTA solution while swirling beaker.
   - Titrate until the solution turns from a pink/red to blue. Once solution is blue, multiply the given number on buret by 20 to get your Calcium hardness value.

4. **Chloride** (Finished)

-Collect 50 ml of sample to be tested in graduated cylinder and transfer to beaker.
-Add 1 packet of yellow chloride 2 indicator powder pillow to beaker and swirl to mix.
-Fill buret to zero with Silver Nitrate standard solution.
-Place beaker under buret and begin to titrate with Silver Nitrate while swirling beaker.
-Titrate until the solution turns from yellow to a reddish/brown color.
-The value is the given value on the buret. No need to multiply by 2.

Fluoride (Raw and Finished)

-Turn on the Hach DR6000, go to favorite programs, and press **190 Fluoride**.
- Pipet 10 ml of Reagent Grade Water into 10 ml square sample cell (this will be used as the blank)
-Pipet 10 ml of sample into a different 10 ml sample cell.
-Use pipet to add 2.0 ml of SPADNS Reagent to both the blank and the sample cell.
-Swirl to mix then set a 1-minute timer, start the timer.
-Dry the sample cells off with a kimwipe.
-Once the timer has gone off place the blank sample cell into the DR 6000 and hit “zero”. Then replace the blank with the sample cell and press “read” and record the value.

Free Chlorine (Raw and Finished)

-Turn on the Hach DR6000, go to favorite programs, and press Chlorine.
-Collect 25 ml of sample to be tested in the given 25 ml glass cell. Wipe and dry with kimwipe or paper towel.
-Place the sample in the DR6000 and “zero”.

-Take the sample out and open 1 DPD free chlorine packet for 25 ml and empty into the sample.
-Shake and mix to allow the DPD powder to dissolve.
-Place cell back in to the DR6000 and press “read”. Record the value given.

Total Chlorine (Raw and Finished)

-Turn on the Hach DR6000, go to favorite programs, and press Chlorine.
-Collect 25 ml of sample to be tested in the given 25 ml glass cell. Wipe and dry with kimwipe or paper towel.
-Place the sample in the DR6000 and “zero”.
-Take the sample out and open 1 DPD total chlorine packet for 25 ml and empty into the sample.
-Shake and mix to allow the DPD powder to dissolve.
-The DR6000 has a built in 3-minute timer. Start timer.
-After 3 minutes. Place sample cell back in to the DR6000 and press “read”. Record the value given.

Iron (Raw and Finished)

-Turn on the Hach DR6000, go to favorite programs, and press Iron.
-Collect 25 ml of sample to be tested in the given 25 ml glass cell. Wipe and dry with kimwipe or paper towel.
-Place the sample in the DR6000 and “zero”.
-Take the sample out and open 1 Iron Phenanthroline packet and empty into sample.
-Shake and mix to allow the powder to dissolve.
-The DR6000 has a built in 3-minute timer. Start timer.
-After 3 minutes. Place sample cell back in to the DR6000 and press read. Record the value given.

TDS (Finished)

-Turn on the Hach sension7. Spray probe with Reagent Grade Water to clean.
-Collect any amount of finished water in a 250 ml beaker as long as the water covers the bottom portion of the probe.
-Place probe in beaker.
-Let value come to a steady reading and press “read”.
-Record value. The TDS also gives the temperature of sample in degrees Celsius.

Jar Test

-Take three 1000 ml beakers and place on the jar mixing table.
-Fill one beaker with 100 ml of raw water representative of what Pirtle is bringing in to treat. (i.e., 500 GPM Gray lane and 1000 GPM Pirtle spring, the 100 ml should= 33.33 ml Gray lane + 66.67 ml Pirtle spring). This will represent the 90% jar.
-Fill a second beaker with 50 ml of raw water representative of what Pirtle is bringing in to treat. (For the same example as above the 50 ml should = 16.67 Gray lane + 33.33 Pirtle spring). This will represent the 95% jar.
-Obviously it will be difficult to get 1/3 of an ml, but try to get the representation as close as possible.
-Take the jug from the lab to the clarifier influent pipe coming from the head tank outside.
-Wash out the jug 3 times and fill the jug from the rubber hose.
-Bring jug inside, continuously inverting to prevent settling.
-Pour into the 3 beakers to allow a total of 1000 ml to fill the beakers. For the 2 beakers already filled with raw water, add 900ml to the 90% jar and 950ml to the 95% jar.
-Place the beakers under the stirrers and drop the stirrers into the beakers.
-The jar mixing machine already has the setting saved that we’ve been using. Press start. This will have a 30 sec. flash mix, a 21 minute slow mix, and then a 5 minute settle.

-Once the program has completed, draw from about an inch down in the beaker with a syringe about 60 ml.
-Using the water collected from the syringe, clean the inside of the sample cell used for the Hach 2100N Turbidimeter. Fill the sample cell to the indicated line and place in the 2100N Turbidimeter.
-Let the value come to a steady reading and record the value. Repeat the last 2 steps for the next 2 beakers.

Total Ammonia (Raw)

-Take an Ammonia test vial out of the BacT lab refrigerator and take to the Ops lab.
-Turn on the Hach DR6000, and press barcode programs.
- Wash out the automatic pipette a few times by drawing up water and releasing to get an accurate sample. Collect 5 ml of raw water to be tested with the automatic pipette.
-Twist off the cap of the vial and release the 5 ml of raw water into the vial.
-Take off the foil cap and invert to where the reagent is now exposed to the raw water. Twist the cap back on and shake 2-3 times.
-The Hach DR6000 has a built in 15-minute timer. Start timer.
-Once timer goes off, place vial in the correct compartment, with barcode facing in towards the arrow. Press “read”.
-Record value.

Sludge Volume Index

-Using the jug connected to the pole, collect sample from the flocculation well section in the clarifier.
-Pour the grab sample from the jug into their marked respective bottles from the lab. (Labeled “#1 clarifier S.V.I. & #2 clarifier S.V.I). I’d suggest to take the bottles outside with you.

-Once into the lab, invert the bottles a few times. You don't want to shake the bottle too vigorously as it could break up the flock.
-Pour 100 mls from the bottle into a 100 ml graduated cylinder. Do this for each clarifier (100 mls from clarifier 1 into a graduated cylinder and 100 mls from clarifier 2 into a graduated cylinder).
-Set a timer for 10 minutes once poured.
-Take a reading after 5 mins. The sludge will be settling. Take another reading after 10 mins. The goal after 10 mins should be between 5%-20% (top of settling point sludge at 15-20 mls.) A good number to have is 15%.
-The same steps are used for the discharge (blowoff) except collect the samples in the jug from the blowoff pit.
-To ensure a beneficial blowoff, the sludge percent settling for 5-10 minutes should be 90-98%. (98% might be mud and a good blowoff).

Monochloramine and Free Ammonia (Finished)

- Turn on the Hach DR6000, go to favorite programs, and press program 66 Monochloramine LR.
- Fill 2 sample cells to the 10-mL line with the sample, write free on one cell and mono on the other cell.
- Clean both sample cells, Put the sample cell that has mono in the DR 6000 and hit zero then take the sample back out.
- Put one drop of free ammonia in the sample labeled free then put the lid on the cell and invert for 15 seconds.
- Start the timer for 1 minute, when the minute is up put on pack of monochlor into each cell.
- Put the tops on and shake for 20 seconds, then set a timer for 5 minutes.
- When the timer goes off clean the cell labeled mono and put it into the DR 6000 and push read. (This will be your Monochloramine result)
- Go Back to the Hach home screen, press favorites then select program 389 free ammonia
- Your cell labeled Mono should still be in the DR 6000 so you will press zero
- Then you will take the cell labeled mono out and wipe off cell labeled free and put your free sample in the DR 6000 and hit read. (This will be your Free Ammonia result)

Nitrite (Finished)

- Turn on the Hach DR6000, go to favorite programs, and press program 371 N. Nitrite
- Fill 2 cells with 10-mL of sample. One will be your Blank.
- Add one packet of NitriVer 3 Reagent Powder Pillow to one cell.
- Swirl sample, it will turn pink if nitrite is present.
- Set timer for 20 minutes and wipe the outside of each sample cell to make sure that it is clean
- After the 20 minute timer goes off place your blank sample in the DR6000 and press zero removing the cell once it is zeroed
- Then place your other sample into the DR 6000 and press read (This will be your Nitrite result)