INSTRUCTION MANUAL

LIGHTLAB™ CANNABIS POTENCY ANALYZER

BY ORANGE PHOTONICS

Version 1.3.3

INTRODUCTION

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INTRODUCTION

INTRODUCTION

Welcome

Welcome and thank you for choosing Orange Photonics.

Your LightLab cannabis potency analyzer comes to you fully calibrated and ready to use. We are proud to serve established cannabis industry leaders and newcomers in support of greater efficiency and higher quality products through data.

On behalf of the entire Orange Photonics team, we look forward to working with you.

Sincerely,

The Orange Photonics Team

INTRODUCTION

LightLab Packing List

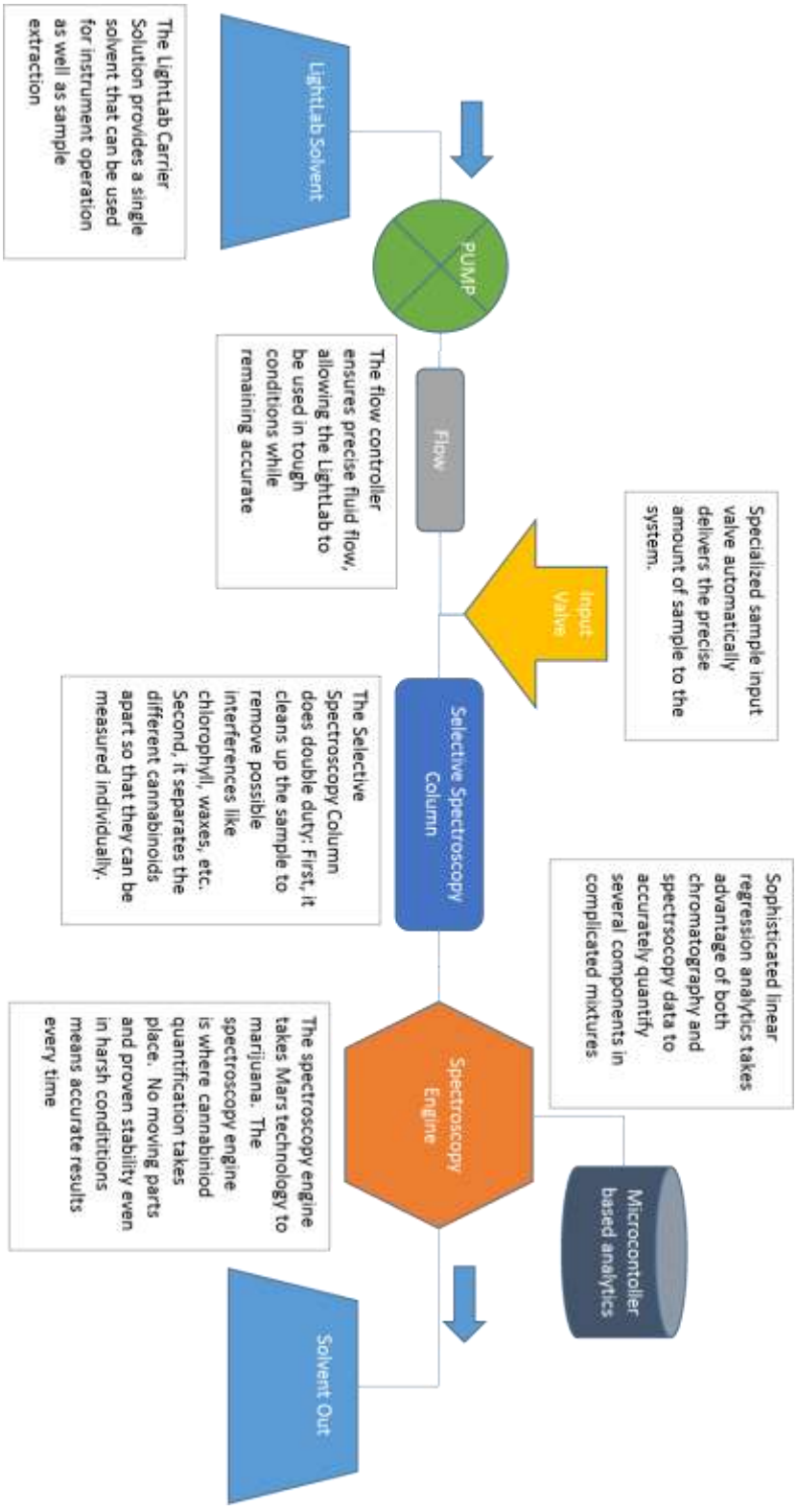
The first time you use the LightLab unpack the components on a clean, flat surface and familiarize yourself with each item.

Packing list:

Items	Units
LightLab Analyzer	1
Extraction Shaker and Power Supply	1
Fluidics Hardware	1
Flushing Hardware	1
Grinder	1
Instruction Manual	1
Power Supply	1
Sample Input Cover	1
Sample Warmer	1
Scale - 20g	1
Scale Calibration Weight	1
SD Card	1
SD Card Reader	1
Shaker Straps	2
Tweezers	1
USB Cable	1

INTRODUCTION

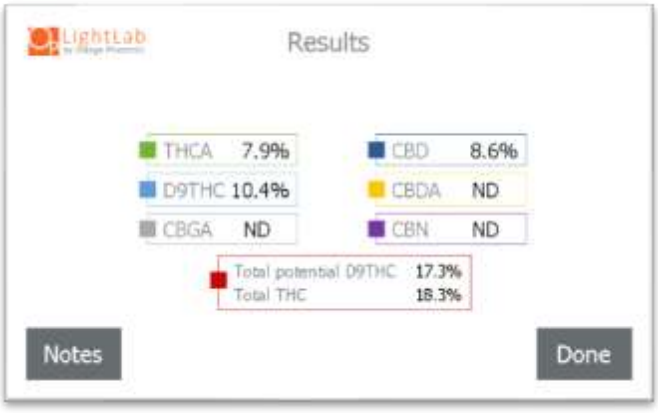
LightLab Technology Overview



INTRODUCTION

What Does LightLab Measure?

LightLab uses a combination of chromatography (chemical separation based on molecule polarity) and spectroscopy (light based chemical analysis) to provide accurate analysis of several components in complex mixtures. Your LightLab is factory calibrated and will begin providing results directly out of the box for 6 major cannabinoids. The following is an explanation of the results the LightLab generates along with an example results screen:



The following is a list of results shown and their meaning:

THCA: Tetrahydrocannabinolic Acid. This is the "acidic" form of tetrahydrocannabinol (THC). Cannabis plants naturally produce THCA and is the primary cannabinoid that will be present in most cannabis strains. Typically, plants have 10-20% THCA. A higher THCA number means a more potent plant.

Δ9THC: Delta 9 Tetrahydrocannabinol. This is the "active" or "neutral" form of THC. This is the primary psychoactive cannabinoid seen in cannabis plants. Plants do not directly produce Δ9THC. Instead, THCA is converted into Δ9THC through a process called decarboxylation. Decarboxylation occurs when the plant is smoked, otherwise heated or exposed to light. Typically, plants have 0-5% Δ9THC. High levels of Δ9THC in plant material indicate the plant may not have been stored or cured well or may be old.

Total Potential Δ9THC: This number indicates the total quantity of Δ9THC if the sample was completely decarboxylated. Decarboxylation is the conversion of THCA to Δ9THC in the presence of heat or light. During the decarboxylation process, a CO2 molecule is released, so a THCA molecule will weigh less once it is converted to Δ9THC. For that reason, the total "potency", or how much psychoactive Δ9THC a user would be

dosed with requires a conversion factor. The "total potential Δ9THC" factors in the loss of weight of THCA when converting to Δ9THC. The equation used is as follows:

Total Potential Δ9THC= 0.877*THCA + Δ9THC

This number is an indication of the overall "potency" of the sample.

Total THC: This number is the sum of THCA + Δ9THC and is typically used to indicate the overall THC cannabinoid content present in a sample. Note this number will always be greater or equal to the "Total Potential Δ9THC". We recommend when considering overall potency to use Total Potential Δ9THC instead of total THC.

CBDA: Cannabidiolic Acid. CBDA is the CBD analog to THCA. It is the acidic from of CBD that plants produce. Typical non-CBD specific strains will have 0-2% CBDA. CBD Specific plants typically contain 5-20% CBDA. CBDA is not psychoactive.

CBD: Cannabidiol. CBD is the neutral form of CBDA. Cannabis plants do not create CBD directly, however this cannabinoid can be formed through the same decarboxylation process described above.

CBN: Cannabinol. CBN is a breakdown component of Δ9THC. It is mildly psychoactive and also sedative. Fresh cannabis plants typically show no CBN. Very old plants may contain 0-5% CBN. CBN can also be generated during extraction or distillation, and commonly occurs at 0-5% levels in extracted samples. More CBN is typically undesirable and is an indication of too much heat or exposure to environmental factors.

CBGA: Cannabigerolic Acid. CBGA is a precursor molecule to THCA and CBDA. When a plant produces cannabinoids, it always produces CBGA first, then an enzymatic process converts CBGA to THCA and/or CBDA. CBGA can be used as an indicator of harvest readiness. If >1% CBGA is present in a sample, it typically means the plant can continue to produce active cannabinoids. A CBGA value of <1% is typically desirable. Plants commonly contain between 0-4% CBGA.

LIGHTLAB SETUP

1. LightLab Setup

1. Open LightLab and remove cap baton and power supply.

2. Plug in LightLab if power is available (LightLab has an 8-hour battery). Do not turn the LightLab on yet. Note: LightLab has two charge settings on the charger (0.9A and 1.8A). We recommend using the 1.8A setting for fastest charge time.

LIGHTLAB SETUP

3. Remove waste cap from baton and place on waste container

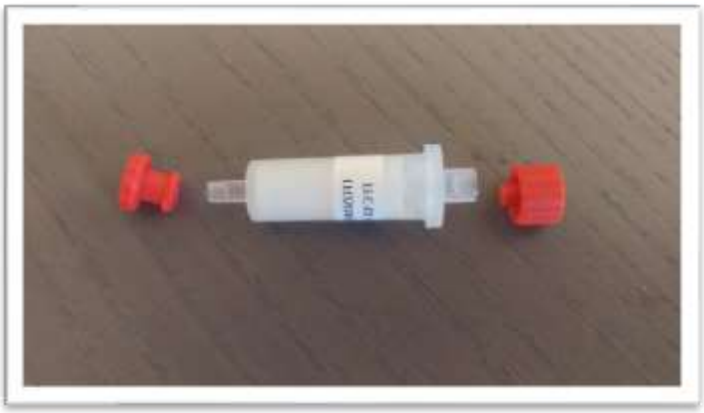
4. Remove solvent cap from baton and place on solvent container

5. Connect fluid lines from bottles to LightLab.

LIGHTLAB SETUP

6. Lift column holder.

7. Remove Selective Separation Column caps and insert into column holder.



LIGHTLAB SETUP

8. Close column holder onto Selective Separation Column.

9. Turn on instrument. A systems check will run. Once complete, the LightLab will ask to start the warmup.

LIGHTLAB SETUP

10. Press “Start Warmup” to begin the warmup process. NOTE: the warmup can be skipped if the solvent caps and fluid connections have not been disconnected and the system has been run recently (within one hour).

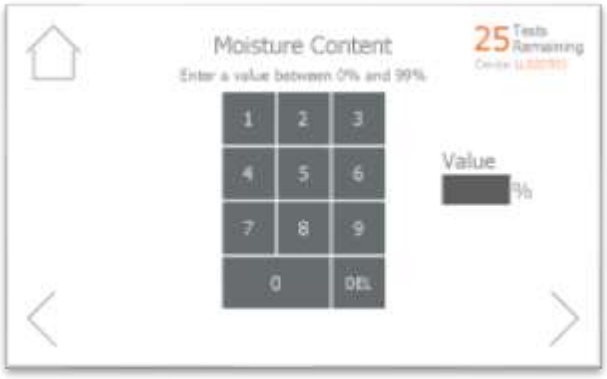
SAMPLE ANALYSIS - FLOWER

2. Sample Analysis- Flower

Flower analysis should be used with any dried and cured cannabis flower material.

1. Select the type of sample to be measured (flower for this section). NOTE: if tests remaining is zero, you will be prompted to replace the column, see Section Replace Solvent

2. If Moisture Correction is enabled, enter the moisture content of the sample to be run. If the moisture is not known, enter 0 to continue.



SAMPLE ANALYSIS - FLOWER

3. Add sample tags to the sample record if desired. These tags will be saved along with the sample results and can be accessed later.

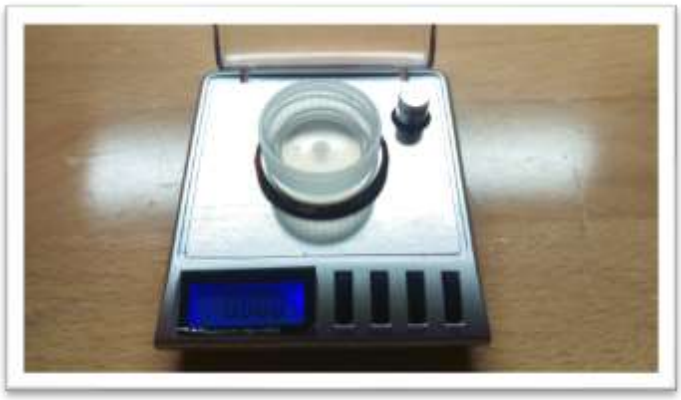
4. Prepare at least 100mg of sample by grinding the sample with the included grinder. More than 100mg can be ground to get a homogenous sample if desired. We recommend grinding more than 1000mg.

5. Place scale on level surface and turn on.

SAMPLE ANALYSIS - FLOWER

6. Check calibration of scale by placing 10g calibration weight on scale. Results should be between 0.997 and 10.003. If not proceed to Section 4 to recalibrate scale.

7. Place a vial cap on the scale and press “tare”. Ensure scale now reads zero with cap resting on it. Press forward arrow on the LightLab screen.



SAMPLE ANALYSIS - FLOWER

8. Add 100mg (+/- 10mg) to the scale. Make sure all sample is within inner circle of cap. Press forward arrow on the screen. NOTE: if moisture content was set to a value greater than 25%, add 500mg (+/- 50mg) to the scale.
   The sample may alternatively be weighed in a small weigh boat or the sample vial. If a weigh boat is used, we recommend placing the whole weigh boat into the sample vial so that no trichomes are lost during the transfer to the vial.

9. Type in the exact sample reading on the scale. 90-110mg is an acceptable range. Press forward arrow on the screen. Note 100mg is 0.100g.

10. Pour sample into the vial. Ensure all the sample is inside the vial and not trapped in the vial cap threads. Press forward arrow on the LightLab screen.

SAMPLE ANALYSIS - FLOWER

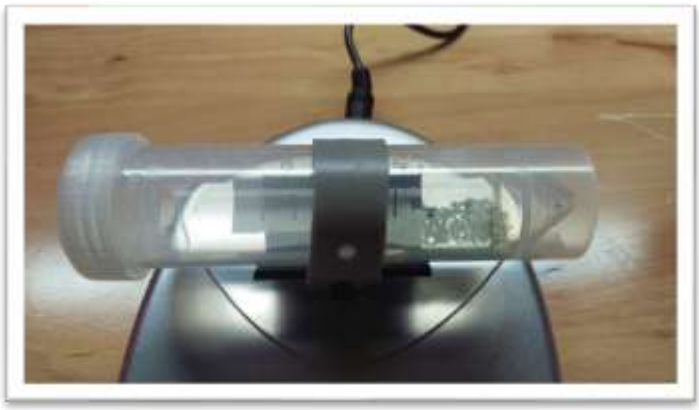
11. Connect the syringe to the solvent cap and pull plunger up to fill syringe. Fill syringe with at least 10ml of solvent.

12. Invert the syringe so that the bubble floats to the tip. Depress the plunger to remove the air bubbles and get the syringe volume to exactly 10ml. A tissue may be used to catch any excess solvent.
    NOTE: It is important to ensure the syringe has exactly 10ml of solvent for accurate results.

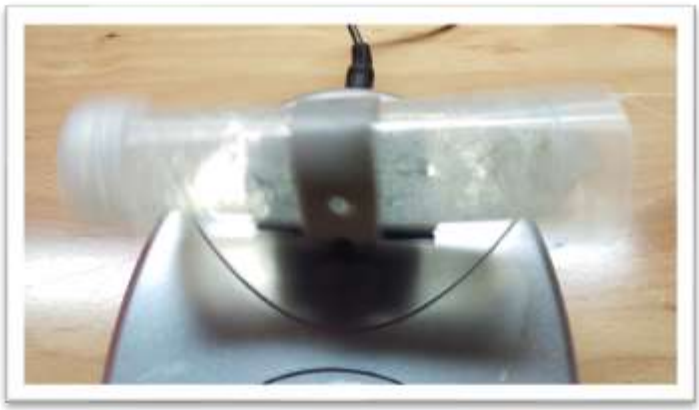
SAMPLE ANALYSIS - FLOWER

13. Add contents of syringe to vial and place cap firmly on vial. Press forward arrow on LightLab screen.

14. Place vial into shaker and strap in place. Press forward arrow on LightLab screen.



15. Turn on shaker and press Start on LightLab screen.



SAMPLE ANALYSIS - FLOWER

16. Zero process will begin, which takes two minutes to complete.

17. Once Zero is complete, add syringe filter onto sample port. Press forward arrow on screen.

18. Set valve to load. Press forward arrow on screen.

SAMPLE ANALYSIS - FLOWER

19. Remove cap from vial and pull at least 2ml of sample into syringe used previously. Exact amount of sample isn't important. Press forward arrow on screen.

20. Place syringe on syringe filter at sample port by gently twisting it on about a quarter turn. Press forward arrow on screen.

21. Slowly inject at least 1ml of sample into sample port. Exact amount isn't important. There will be some resistance when injecting a sample- this is normal. Press forward arrow on screen.

SAMPLE ANALYSIS - FLOWER

22. Set valve to Run. Press forward arrow on screen.

23. Press Start. The LightLab will begin to analyze the sample. Results will be ready in 8 minutes.

24. Once sampling is complete, results are displayed on the screen. A note can be added to the sample if desired. If SD card is installed, results will be added to a comma separated value (Excel compatible) file. Do not reuse syringe, filter or vial for future tests unless re-running the same sample.

SAMPLE ANALYSIS - CONCENTRATES

3. Sample Analysis- Concentrates

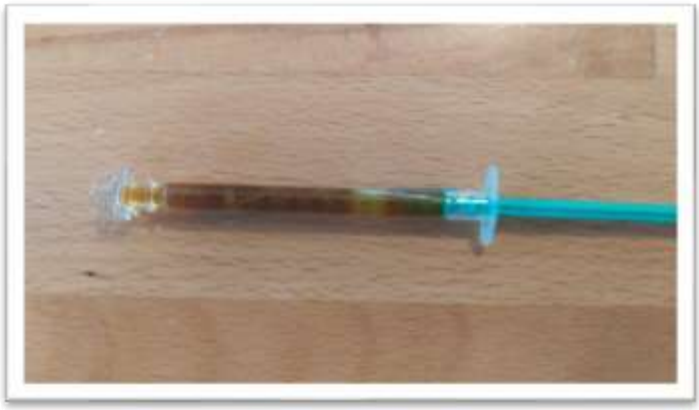
Concentrates setting should be used for any extracted cannabis material including CO2, ethanol and butane extracts, distillates and other concentrated cannabis extracts.

1. Select the type of sample to be measured (concentrate for this section). NOTE: if tests remaining is zero, you will be prompted to replace the column, see Section 11

2. Add sample tags to the sample record if desired. These tags will be saved along with the sample results and can be accessed later.

SAMPLE ANALYSIS - CONCENTRATES

3. Gather at least 100mg of sample. Most samples do not need any specific preparation; however, this may vary depending on the sample type.



4. Place scale on level surface and turn on.

5. Check calibration of scale by placing 10g calibration weight on scale. Results should be between 0.997 and 10.003. If not proceed to Section 4 to recalibrate scale.

SAMPLE ANALYSIS - CONCENTRATES

6. Place a vial cap on the scale and press “tare”. Ensure scale now reads zero with cap resting on it. Press forward arrow on the screen.

7. Add 100mg (+/- 10mg) to the vial cap. Make sure all sample is within inner circle of cap. Press forward arrow on the screen.

8. Type in the exact sample reading on the scale. 90-110mg is an acceptable range. Press forward arrow on the screen. Note 100mg is 0.100g.

SAMPLE ANALYSIS - CONCENTRATES

9. Pour sample into the vial (depending on sample it may stay on cap). Ensure all the sample is inside the vial and not trapped in the vial cap threads. Press forward arrow on the LightLab screen.

10. Connect the syringe to the solvent cap and pull up plunger to fill syringe. Fill syringe with at least 10ml of solvent.

SAMPLE ANALYSIS - CONCENTRATES

11. Invert the syringe so that the bubble floats to the tip. Depress the plunger to remove the air bubbles and get the syringe volume to exactly 10ml. A tissue may be used to catch any excess solvent.
    NOTE: It is important to ensure the syringe has exactly 10ml of solvent for accurate results.

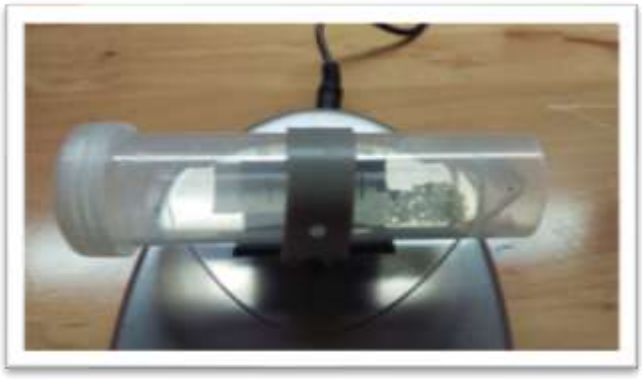
12. Add contents of syringe to vial and place cap firmly on vial. Press forward arrow on screen.

13. FOR EXTRACTS GREATER THAN 35% ONLY: repeat steps 11 and 12 **twice more** so that a <u>total of 30ml</u> is in the sample vial.

SAMPLE ANALYSIS - CONCENTRATES

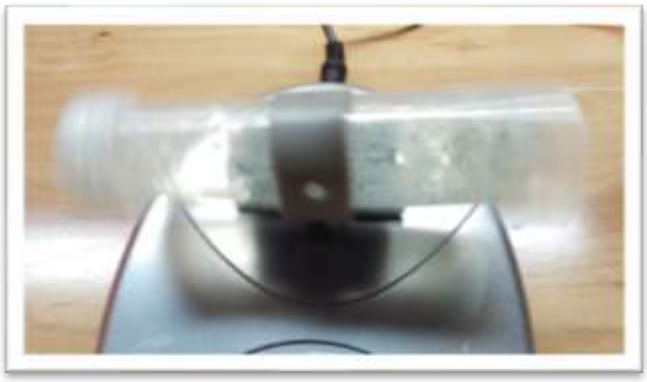
14. Place the extraction vial into the sample heater, then fill the included measuring cup with water and pour contents into the heater. Most samples will be heated sufficiently by filling measuring cup to the “E” line. Press firmly down on the button near the bottom of the heater to start heating.

15. The heater will boil water and make steam which causes the contents of the sample vial to warm up. Heating takes approximately 2 minutes.
16. Once the orange light on the heater turns off and all water in the heater has boiled away, remove vial carefully (it may be hot!) and place vial into shaker and strap in place. Press forward arrow on screen. NOTE: For best results place sample into shaker immediately after heating is complete. If the sample cools off the extraction may be poor.



SAMPLE ANALYSIS - CONCENTRATES

17. Turn on shaker and press Start on screen.



18. Zero process will begin, which takes two minutes to complete.

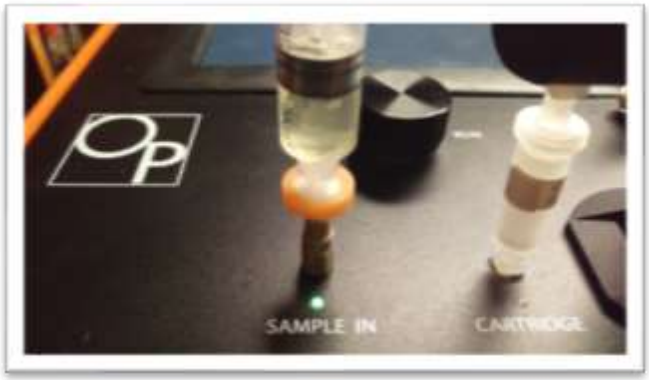
19. After completion of the zero, inspect the vial. If the sample has not fully dissolved or if there is a significant amount of residue on the vial from the sample repeat the heating and extraction process again. Do not continue until all the sample is dissolved or the results may not be accurate.
20. Once Zero is complete, add syringe filter onto sample port. Press forward arrow on screen.

SAMPLE ANALYSIS - CONCENTRATES

21. Set valve to load. Press forward arrow on screen.

22. Remove cap from vial and pull about 2ml of sample into syringe used previously. Exact amount of sample isn't important. Press forward arrow on screen.

23. Place syringe on syringe filter at sample port by twisting it on about a quarter turn. Press forward arrow on screen.



SAMPLE ANALYSIS - CONCENTRATES

24. Slowly inject at least 1ml of sample into sample port. Exact amount isn't important. There will be some resistance when injecting a sample- this is normal. Press forward arrow on screen.

25. Set valve to Run. Press forward arrow on screen.

26. Press Start. The LightLab will begin to analyze the sample. Results will be ready in 8 minutes.

SAMPLE ANALYSIS - CONCENTRATES

27. Once sampling is complete, results are displayed on the screen. A note can be added to the sample if desired. If SD card is installed, results will be added to a comma separated value (Excel compatible) file. Do not reuse syringe, filter or vial for future tests unless re-running the same sample.

SAMPLE ANALYISIS- TRIM

4. Sample Analysis- Trim

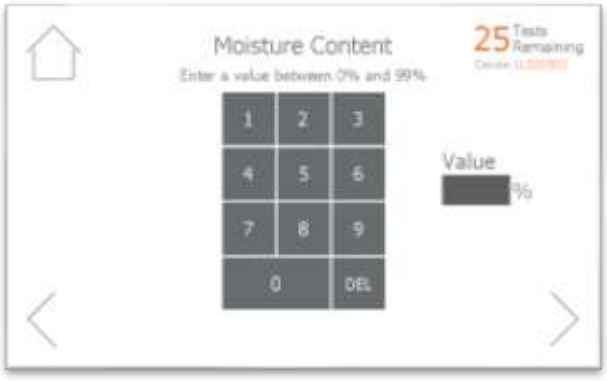
Trim analysis should be used for any cannabis “trim” that contains flower, leaf and plant stalk. Trim is typically used for cannabis extraction.

1. Select “Other” as the sample type for the main screen.

2. Select the type of sample to be measured from the new list that appears (Trim for this section). NOTE: if tests remaining is zero, you will be prompted to replace the column, see Section 11

SAMPLE ANALYISIS- TRIM

3. If Moisture Correction is enabled, enter the moisture content of the sample to be run. If the moisture is not known, enter 0 to continue.



4. Add sample tags to the sample record if desired. These tags will be saved along with the sample results and can be accessed later.

5. Prepare at least 100mg of sample by grinding the sample with the included grinder. More than 100mg can be ground to get a homogenous sample if desired. We recommend grinding more than 1000mg. samples from multiple bags or

SAMPLE ANALYISIS- TRIM

6. Place scale on level surface and turn on.

7. Check calibration of scale by placing 10g calibration weight on scale. Results should be between 0.997 and 10.003. If not proceed to Section 4 to recalibrate scale.

8. Place a vial cap on the scale and press “tare”. Ensure scale now reads zero with cap resting on it. Press forward arrow on the LightLab screen.

SAMPLE ANALYISIS- TRIM

9. Add 100mg (+/- 10mg) to the scale. Make sure all sample is within inner circle of cap. Press forward arrow on the screen. NOTE: if moisture content was set to a value greater than 25%, add 500mg (+/- 50mg) to the scale.
   The sample may alternatively be weighed in a small weigh boat or the sample vial. If a weigh boat is used, we recommend placing the whole weigh boat into the sample vial so that no trichomes are lost during the transfer to the vial.

10. Type in the exact sample reading on the scale. 90-110mg is an acceptable range. Press forward arrow on the screen. Note 100mg is 0.100g.

11. Pour sample into the vial. Ensure all the sample is inside the vial and not trapped in the vial cap threads. Press forward arrow on the LightLab screen.

SAMPLE ANALYISIS- TRIM

12. Connect the syringe to the solvent cap and pull plunger up to fill syringe. Fill syringe with at least 10ml of solvent.

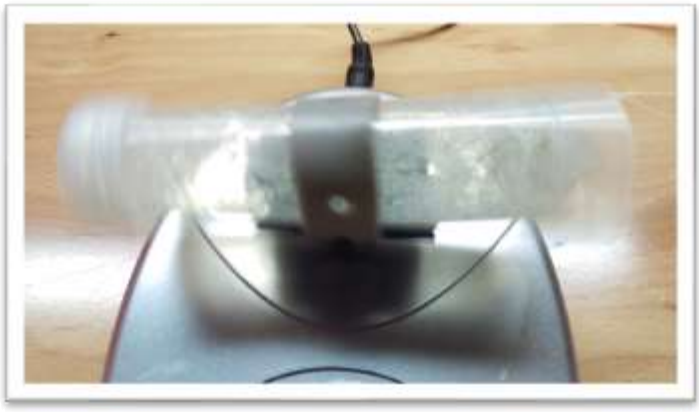
13. Invert the syringe so that the bubble floats to the tip. Depress the plunger to remove the air bubbles and get the syringe volume to exactly 10ml. A tissue may be used to catch any excess solvent.
    NOTE: It is important to ensure the syringe has exactly 10ml of solvent for accurate results.

SAMPLE ANALYISIS- TRIM

14. Add contents of syringe to vial and place cap firmly on vial. Press forward arrow on LightLab screen.

15. Place vial into shaker and strap in place. Press forward arrow on LightLab screen.

16. Turn on shaker and press Start on LightLab screen.



SAMPLE ANALYISIS- TRIM

17. Zero process will begin, which takes two minutes to complete.

18. Once Zero is complete, add syringe filter onto sample port. Press forward arrow on screen.

19. Set valve to load. Press forward arrow on screen.

SAMPLE ANALYISIS- TRIM

20. Remove cap from vial and pull at least 2ml of sample into syringe used previously. Exact amount of sample isn't important. Press forward arrow on screen.

21. Place syringe on syringe filter at sample port by gently twisting it on about a quarter turn. Press forward arrow on screen.

22. Slowly inject at least 1ml of sample into sample port. Exact amount isn't important. There will be some resistance when injecting a sample- this is normal. Press forward arrow on screen.

SAMPLE ANALYISIS- TRIM

23. Set valve to Run. Press forward arrow on screen.

24. Press Start. The LightLab will begin to analyze the sample. Results will be ready in 8 minutes.

25. Once sampling is complete, results are displayed on the screen. A note can be added to the sample if desired. If SD card is installed, results will be added to a comma separated value (Excel compatible) file. Do not reuse syringe, filter or vial for future tests unless re-running the same sample.

SAMPLE ANALYISIS- WET FLOWER

5. Sample Analysis- Wet Flower

Wet flower analysis should be used for any living cannabis plant before or just at harvest time

NOTE: Wet flower is an advanced analysis that may require modifications to the procedure below depending on the data/reporting required. It is not recommended for novice LightLab users.

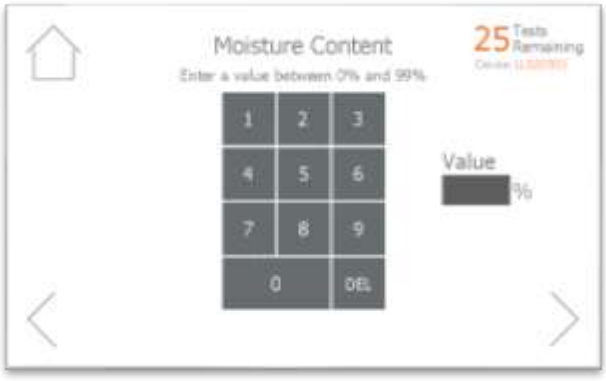
1. Select “Other” as the sample type for the main screen.

2. Select the type of sample to be measured from the new list that appears (Wet Plant for this section). NOTE: if tests remaining is zero, you will be prompted to replace the column, see Section 11

SAMPLE ANALYISIS- WET FLOWER

3. Select the stage of the plant. Select “vegetative” for early stage plants before flowers appear on the plant. Select “flowering” for plants nearing harvest.

4. Enter the moisture content of the sample to be run. If the moisture is not known, enter 0 to continue. For THC/CBD ratio testing, we recommend entering 0 and not drying the plant. For quantitative analysis, we recommend either analyzing the moisture content using a gravimetric moisture meter or drying the sample to 0% moisture. A food dehydrator or a short time in a microwave are options for quick drying times.



5. Add sample tags to the sample record if desired. These tags will be saved along with the sample results and can be accessed later.

SAMPLE ANALYISIS- WET FLOWER

6. Gather at least 2g of sample from the plant. Note the cannabinoid content may be significantly different from a leaf sample when compared to a flower. We recommend gathering flower parts for flowering plants and large healthy leaves for vegetative plants. Grinding or macerating the sample may improve sample extraction and is recommended for dried material.

7. Place scale on level surface and turn on.

8. Check calibration of scale by placing 10g calibration weight on scale. Results should be between 0.997 and 10.003. If not proceed to Section 4 to recalibrate scale.

SAMPLE ANALYISIS- WET FLOWER

9. Place a vial cap on the scale and press “tare”. Ensure scale now reads zero with cap resting on it. Press forward arrow on the LightLab screen.

10. Add the amount of sample indicated by the device (either 100mg (+/- 10mg) or 500mg (+/-50mg) depending on the options selected) to the scale. Make sure all sample is within inner circle of cap. Press forward arrow on the screen.
    The sample may alternatively be weighed in a small weigh boat or the sample vial. If a weigh boat is used, we recommend placing the whole weigh boat into the sample vial so that no trichomes are lost during the transfer to the vial.

SAMPLE ANALYISIS- WET FLOWER

11. Type in the exact sample reading on the scale. Press forward arrow on the screen. Note 100mg is 0.100g.

12. Pour sample into the vial. Ensure all the sample is inside the vial and not trapped in the vial cap threads. Press forward arrow on the LightLab screen.

13. Connect the syringe to the solvent cap and pull plunger up to fill syringe. Fill syringe with either 5ml or 10ml of solvent depending on the options selected. The LightLab will indicate the correct amount to add.
    NOTE: Be careful when determining the correct amount of solvent! Adding a different amount than is indicated on the LightLab screen will cause incorrect results to be displayed.

SAMPLE ANALYISIS- WET FLOWER

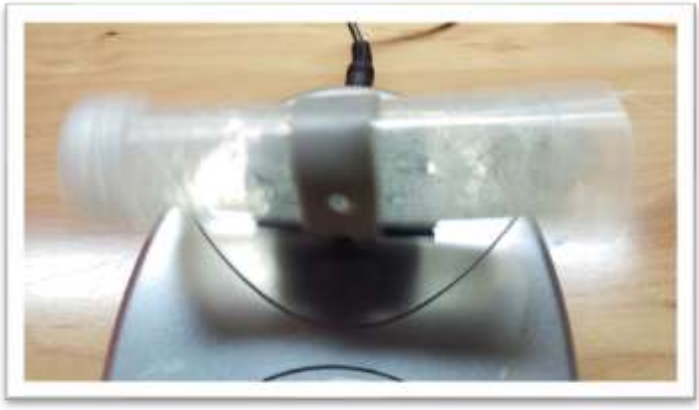
14. Invert the syringe so that the bubble floats to the tip. Depress the plunger to remove the air bubbles and get the syringe volume to exactly 5ml or 10ml depending on options selected. A tissue may be used to catch any excess solvent. NOTE: It is important to ensure the syringe has the exact amount of solvent indicated for accurate results.

15. Add contents of syringe to vial and place cap firmly on vial. Press forward arrow on LightLab screen.

SAMPLE ANALYISIS- WET FLOWER

16. Place vial into shaker and strap in place. Press forward arrow on LightLab screen.

17. Turn on shaker and press Start on LightLab screen.



18. Zero process will begin, which takes two minutes to complete.

SAMPLE ANALYISIS- WET FLOWER

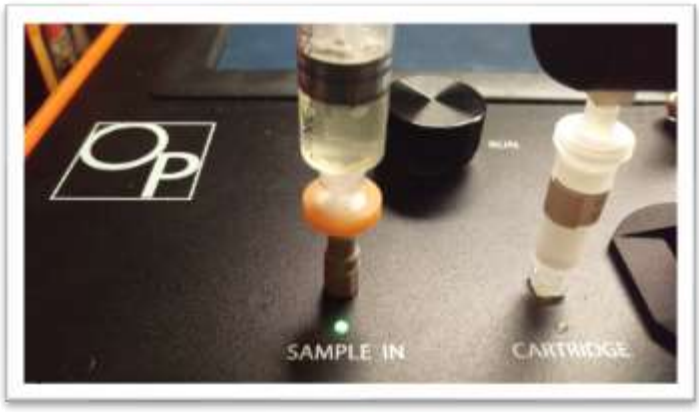
19. Once Zero is complete, add syringe filter onto sample port. Press forward arrow on screen.

20. Set valve to load. Press forward arrow on screen.

21. Remove cap from vial and pull at least 2ml of sample into syringe used previously. Exact amount of sample isn't important. Press forward arrow on screen.

SAMPLE ANALYISIS- WET FLOWER

22. Place syringe on syringe filter at sample port by gently twisting it on about a quarter turn. Press forward arrow on screen.



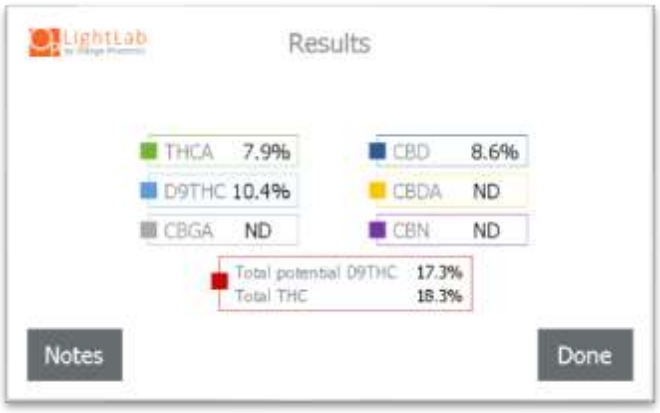
23. Slowly inject at least 1ml of sample into sample port. Exact amount isn't important. There will be some resistance when injecting a sample- this is normal. Press forward arrow on screen.

24. Set valve to Run. Press forward arrow on screen.

SAMPLE ANALYISIS- WET FLOWER

25. Press Start. The LightLab will begin to analyze the sample. Results will be ready in 8 minutes.

26. Once sampling is complete, results are displayed on the screen. A note can be added to the sample if desired. If SD card is installed, results will be added to a comma separated value (Excel compatible) file. Do not reuse syringe, filter or vial for future tests unless re-running the same sample.
    Note: Detection limits will vary depending on the options selected using the following equation:
    Detection Limit (%)= (100/(Weight Entered))*(ml Solvent Added)/10)*(1-100/(Moisture Content Entered))
    In general terms:
    - An increase in sample weight will provide a lower detection limit
    - An increase in solvent volume will provide a higher detection limit
    - An increase in moisture content will provide a lower detection limit



SAMPLE ANALYISIS- RAFFINATE

6. Sample Analysis- Raffinate

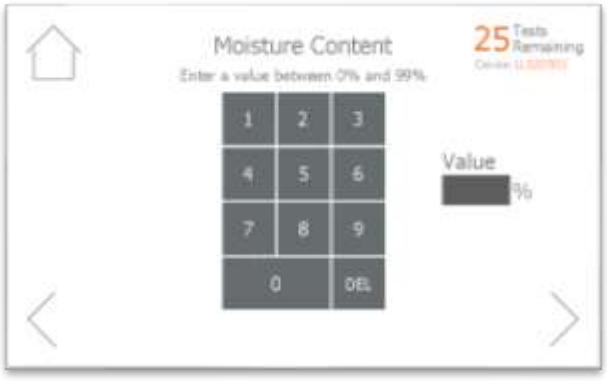
Raffinate analysis should be used for plant material which has previously been extracted using CO2, Butane, Ethanol, etc. Raffinate is typically tested to ensure extraction was run to completion. The addition of 200mg rather than the 100mg used for Flower analysis allows a detection limit of 0.5% (flower has a detection limit of 1%)

1. Select "Other" as the sample type for the main screen.

2. Select the type of sample to be measured (raffinate for this section). NOTE: if tests remaining is zero, you will be prompted to replace the column, see Section 11

SAMPLE ANALYISIS- RAFFINATE

3. If Moisture Correction is enabled, enter the moisture content of the sample to be run. If the moisture is not known, enter 0 to continue.



4. Add sample tags to the sample record if desired. These tags will be saved along with the sample results and can be accessed later.

5. Prepare at least 200mg of sample by grinding the sample with the included grinder if required. More than 200mg can be prepared to get a homogenous sample if desired. We recommend preparing more than 1000mg.

SAMPLE ANALYISIS- RAFFINATE

6. Place scale on level surface and turn on.

7. Check calibration of scale by placing 10g calibration weight on scale. Results should be between 0.997 and 10.003. If not proceed to Section 4 to recalibrate scale.

8. Place a vial cap on the scale and press “tare”. Ensure scale now reads zero with cap resting on it. Press forward arrow on the LightLab screen.

SAMPLE ANALYISIS- RAFFINATE

9. Add 200mg (+/- 20mg) to the scale. Make sure all sample is within inner circle of cap. Press forward arrow on the screen. NOTE: if moisture content was set to a value greater than 25%, add 500mg (+/- 50mg) to the scale.
   The sample may alternatively be weighed in a small weigh boat or the sample vial. If a weigh boat is used, we recommend placing the whole weigh boat into the sample vial so that no trichomes are lost during the transfer to the vial.

10. Type in the exact sample reading on the scale. 180-220mg is an acceptable range. Press forward arrow on the screen. Note 100mg is 0.100g.

11. Pour sample into the vial. Ensure all the sample is inside the vial and not trapped in the vial cap threads. Press forward arrow on the LightLab screen.

SAMPLE ANALYISIS- RAFFINATE

12. Connect the syringe to the solvent cap and pull plunger up to fill syringe. Fill syringe with at least 10ml of solvent.

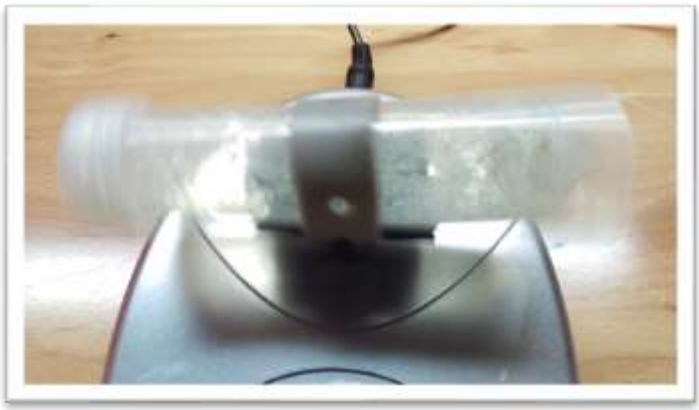
13. Invert the syringe so that the bubble floats to the tip. Depress the plunger to remove the air bubbles and get the syringe volume to exactly 10ml. A tissue may be used to catch any excess solvent.
    NOTE: It is important to ensure the syringe has exactly 10ml of solvent for accurate results.

SAMPLE ANALYISIS- RAFFINATE

14. Add contents of syringe to vial and place cap firmly on vial. Press forward arrow on LightLab screen.

15. Place vial into shaker and strap in place. Press forward arrow on LightLab screen.

16. Turn on shaker and press Start on LightLab screen.



SAMPLE ANALYISIS- RAFFINATE

17. Zero process will begin, which takes two minutes to complete.

18. Once Zero is complete, add syringe filter onto sample port. Press forward arrow on screen.

19. Set valve to load. Press forward arrow on screen.

SAMPLE ANALYISIS- RAFFINATE

20. Remove cap from vial and pull at least 2ml of sample into syringe used previously. Exact amount of sample isn't important. Press forward arrow on screen.

21. Place syringe on syringe filter at sample port by gently twisting it on about a quarter turn. Press forward arrow on screen.

22. Slowly inject at least 1ml of sample into sample port. Exact amount isn't important. There will be some resistance when injecting a sample- this is normal. Press forward arrow on screen.

SAMPLE ANALYISIS- RAFFINATE

23. Set valve to Run. Press forward arrow on screen.

24. Press Start. The LightLab will begin to analyze the sample. Results will be ready in 8 minutes.

25. Once sampling is complete, results are displayed on the screen. A note can be added to the sample if desired. If SD card is installed, results will be added to a comma separated value (Excel compatible) file. Do not reuse syringe, filter or vial for future tests unless re-running the same sample.

SAMPLE ANALYISIS- INFUSED PRODUCT

7. Sample Analysis- Infused Product

Infused product should be selected when analyzing products infused with cannabis, for example tinctures or edibles. Infused products may require specialized sample preparation techniques. Infused product setting reports samples in mg/g to facilitate easy conversion to dosage. For example, a sample that reads 2mg/g and has a weight of 5g would have a total dose of 10mg (2mg/g*5g). We recommend validating any sample preparation and analysis before routine analysis. Some samples may not be possible to measure with a standard LightLab analyzer. Contact Orange Photonics support if assistance is required.

NOTE: Infused Product is an advanced analysis that may require modifications to the procedure below depending on the data/reporting required. It is not recommended for novice LightLab users.

1. Select “Other” as the sample type for the main screen.

2. Select the type of sample to be measured from the new list that appears (Infused Product for this section). NOTE: if tests remaining is zero, you will be prompted to replace the column, see Section 11

SAMPLE ANALYISIS- INFUSED PRODUCT

3. Add sample tags to the sample record if desired. These tags will be saved along with the sample results and can be accessed later.

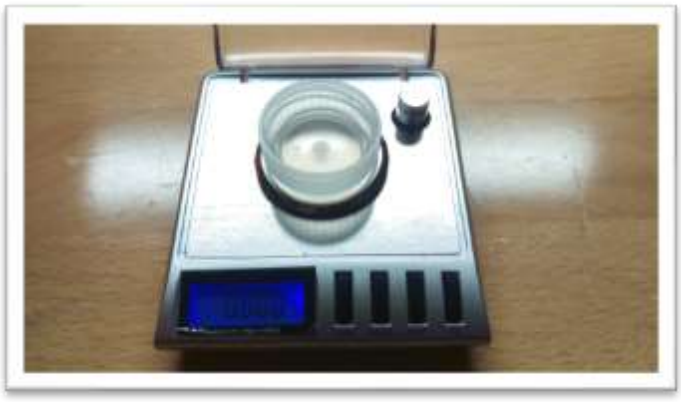
4. Gather a representative sample to be analyzed. The amount of sample required will vary depending on the potency and type of sample. LightLab analyzer can analyze between 0.1-3mg cannabinoid/1ml LightLab solvent. The recommended target value is 1.5mg cannabinoid/1ml LightLab solvent. We recommend using at least 10ml of LightLab solvent and 100mg of sample for best accuracy.

5. Place scale on level surface and turn on.

SAMPLE ANALYISIS- INFUSED PRODUCT

6. Check calibration of scale by placing 10g calibration weight on scale. Results should be between 0.997 and 10.003. If not proceed to Section 4 to recalibrate scale.

7. Place a vial cap on the scale and press “tare”. Ensure scale now reads zero with cap resting on it. Press forward arrow on the LightLab screen.



SAMPLE ANALYISIS- INFUSED PRODUCT

8. Add the amount of sample required for analysis to the scale (1-99999mg is allowed). Make sure all sample is within inner circle of cap. Press forward arrow on the screen.
   The sample may alternatively be weighed in a small weigh boat or the sample vial. If a weigh boat is used, we recommend placing the whole weigh boat into the sample vial so that no sample is lost during the transfer to the vial.

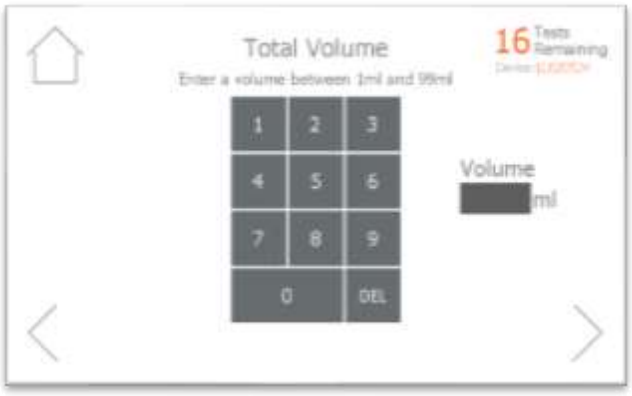
9. Type in the exact sample reading on the scale. Press forward arrow on the screen. Note 100mg is 0.100g.

10. Pour sample into the vial. Ensure all the sample is inside the vial and not trapped in the vial cap threads. Press forward arrow on the LightLab screen.

SAMPLE ANALYISIS- INFUSED PRODUCT

11. Connect the syringe to the solvent cap and pull plunger up to fill syringe. Fill syringe with the amount of solvent required for analysis. Enter the exact amount of solvent into the LightLab

    NOTE: Be careful when entering the correct amount of solvent! Adding a different amount than is indicated on the LightLab screen will cause in incorrect results to be displayed.



SAMPLE ANALYISIS- INFUSED PRODUCT

12. Invert the syringe so that the bubble floats to the tip. Depress the plunger to remove the air bubbles and get the syringe volume to the required volume. A tissue may be used to catch any excess solvent.
    NOTE: It is important to ensure the syringe has the exact amount of solvent indicated for accurate results.

13. Add contents of syringe to vial and place cap firmly on vial. Press forward arrow on LightLab screen.

SAMPLE ANALYISIS- INFUSED PRODUCT

14. Perform sample extraction required for analysis. This may involve using sample warmer and/or shaker or external equipment. Ensure sample is fully extracted into LightLab solvent to ensure accurate results.

15. Press Start on LightLab screen. Zero process will begin, which takes two minutes to complete.

16. Once Zero is complete, add syringe filter onto sample port. Note some samples may require larger filters. Press forward arrow on screen.

17.

SAMPLE ANALYISIS- INFUSED PRODUCT

18. Set valve to load. Press forward arrow on screen.

19. Remove cap from vial and pull at least 2ml of sample into syringe used previously. Exact amount of sample isn't important. Press forward arrow on screen.

20. Place syringe on syringe filter at sample port by gently twisting it on about a quarter turn. Press forward arrow on screen.

SAMPLE ANALYISIS- INFUSED PRODUCT

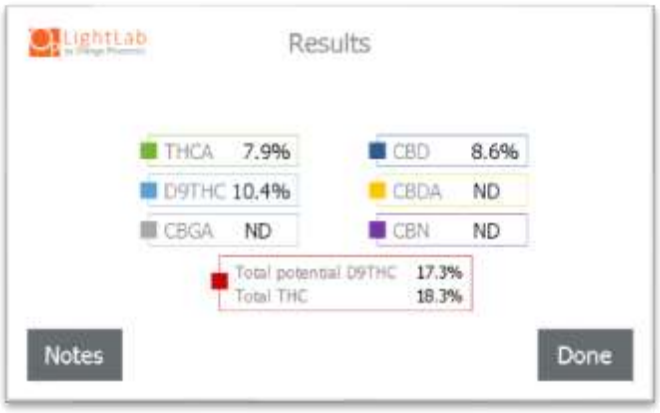
21. Slowly inject at least 1ml of sample into sample port. Exact amount isn't important. There will be some resistance when injecting a sample- this is normal. Press forward arrow on screen.

22. Set valve to Run. Press forward arrow on screen.

23. Press Start. The LightLab will begin to analyze the sample. Results will be ready in 8 minutes.

SAMPLE ANALYISIS- INFUSED PRODUCT

24. Once sampling is complete, results are displayed on the screen. A note can be added to the sample if desired. If SD card is installed, results will be added to a comma separated value (Excel compatible) file. Do not reuse syringe, filter or vial for future tests unless re-running the same sample.
    Note: Detection limits will vary depending on the options selected using the following equation:
    Detection Limit (mg/g)= 10*(100/(Weight Entered))*(ml Solvent Added)/10)
    In general terms:
    - An increase in sample weight will provide a lower detection limit
    - An increase in solvent volume will provide a higher detection limit



SAMPLE ANALYISIS- CUSTOM

8. Sample Analysis- Custom

Custom should be selected when analyzing products that fall outside of any standard LightLab measurable products. Custom analysis may require specialized sample preparation techniques. We recommend validating any sample preparation and analysis before routine analysis. Some samples may not be possible to measure with a standard LightLab analyzer. Contact Orange Photonics support if assistance is required.

NOTE: Custom is an advanced analysis that may require modifications to the procedure below depending on the data/reporting required. It is not recommended for novice LightLab users.

1. Select "Other" as the sample type for the main screen.

2. Select the type of sample to be measured from the new list that appears (Custom for this section). NOTE: if tests remaining is zero, you will be prompted to replace the column, see Section 11

SAMPLE ANALYISIS- CUSTOM

3. Add sample tags to the sample record if desired. These tags will be saved along with the sample results and can be accessed later.

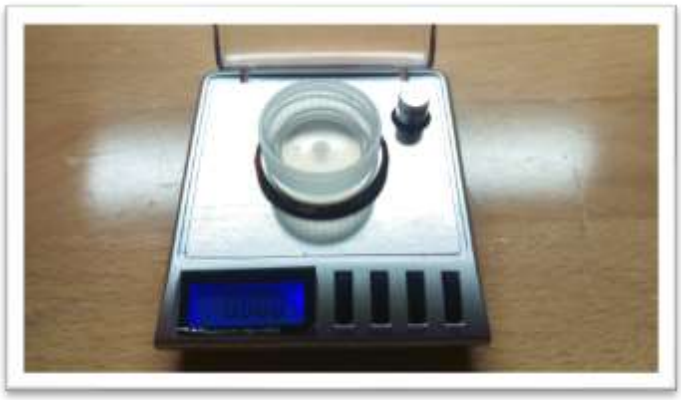
4. Gather a representative sample to be analyzed. The amount of sample required will vary depending on the potency and type of sample. LightLab analyzer can analyze between 0.1-3mg cannabinoid/1ml LightLab solvent. The recommended target value is 1.5mg cannabinoid/1ml LightLab solvent. We recommend using at least 10ml of LightLab solvent and 100mg of sample for best accuracy.

5. Place scale on level surface and turn on.

SAMPLE ANALYISIS- CUSTOM

6. Check calibration of scale by placing 10g calibration weight on scale. Results should be between 0.997 and 10.003. If not proceed to Section 4 to recalibrate scale.

7. Place a vial cap on the scale and press “tare”. Ensure scale now reads zero with cap resting on it. Press forward arrow on the LightLab screen.



SAMPLE ANALYISIS- CUSTOM

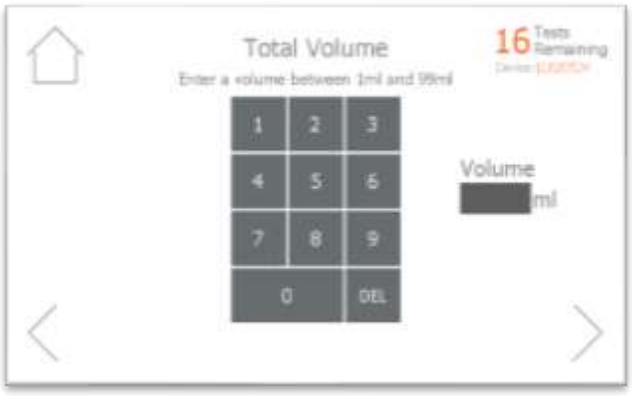
8. Add the amount of sample required for analysis to the scale (1-99999mg is allowed). Make sure all sample is within inner circle of cap. Press forward arrow on the screen.
   The sample may alternatively be weighed in a small weigh boat or the sample vial. If a weigh boat is used, we recommend placing the whole weigh boat into the sample vial so that no sample is lost during the transfer to the vial.

9. Type in the exact sample reading on the scale. Press forward arrow on the screen. Note 100mg is 0.100g.

10. Pour sample into the vial. Ensure all the sample is inside the vial and not trapped in the vial cap threads. Press forward arrow on the LightLab screen.

SAMPLE ANALYISIS- CUSTOM

11. Connect the syringe to the solvent cap and pull plunger up to fill syringe. Fill syringe with the amount of solvent required for analysis. Enter the exact amount of solvent into the LightLab
    NOTE: Be careful when entering the correct amount of solvent! Adding a different amount than is indicated on the LightLab screen will cause in incorrect results to be displayed.



SAMPLE ANALYISIS- CUSTOM

12. Invert the syringe so that the bubble floats to the tip. Depress the plunger to remove the air bubbles and get the syringe volume to the required volume. A tissue may be used to catch any excess solvent.
    NOTE: It is important to ensure the syringe has the exact amount of solvent indicated for accurate results.

13. Add contents of syringe to vial and place cap firmly on vial. Press forward arrow on LightLab screen.

SAMPLE ANALYISIS- CUSTOM

14. Perform sample extraction required for analysis. This may involve using sample warmer and/or shaker or external equipment. Ensure sample is fully extracted into LightLab solvent to ensure accurate results.

15. Press Start on LightLab screen. Zero process will begin, which takes two minutes to complete.

16. Once Zero is complete, add syringe filter onto sample port. Note some samples may require larger filters. Press forward arrow on screen.

SAMPLE ANALYISIS- CUSTOM

17. Set valve to load. Press forward arrow on screen.

18. Remove cap from vial and pull at least 2ml of sample into syringe used previously. Exact amount of sample isn't important. Press forward arrow on screen.

19. Place syringe on syringe filter at sample port by gently twisting it on about a quarter turn. Press forward arrow on screen.

SAMPLE ANALYISIS- CUSTOM

20. Slowly inject at least 1ml of sample into sample port. Exact amount isn't important. There will be some resistance when injecting a sample- this is normal. Press forward arrow on screen.

21. Set valve to Run. Press forward arrow on screen.

22. Press Start. The LightLab will begin to analyze the sample. Results will be ready in 8 minutes.

SAMPLE ANALYISIS- CUSTOM

23. Once sampling is complete, results are displayed on the screen. A note can be added to the sample if desired. If SD card is installed, results will be added to a comma separated value (Excel compatible) file. Do not reuse syringe, filter or vial for future tests unless re-running the same sample.
    Note: Detection limits will vary depending on the options selected using the following equation:
    Detection Limit (%)= (100/(Weight Entered))*(ml Solvent Added)/10)*(1-100/(Moisture Content Entered))
    In general terms:
    - An increase in sample weight will provide a lower detection limit
    - An increase in solvent volume will provide a higher detection limit
    - An increase in moisture content will provide a lower detection limit

SHUTTING DOWN

9. Shutting Down

If LightLab is typically left in one location, it does not need to be completely packed away and can remain set up. If the device will be used again in less than one day, we recommend simply turning off the analyzer. If the device will not be used for more than a day we recommend removing the LightLab Solvent cap and replacing it with the storage cap to avoid excessive evaporation. The column can remain in place in either case.

To completely shut down and pack away LightLab use the following steps:

1. Turn off LightLab and unplug system.

2. The power brick and plug can be stored in the right side of the storage compartment.

SHUTTING DOWN

3. Remove Selective Separation Column and place red caps on the column. Close column holder.
   NOTE: It is important to keep the column wet for best performance. Always immediately replace red caps when storing the column, do not store without caps in place. The column can be stored in the small hole near the center of the instrument.

4. Remove fluid lines and place in cap baton. Placing them in partway and tapping the baton on the table allows them to slide to the bottom of the baton.

5. Remove solvent cap and place in baton. Place storage cap on solvent bottle and tighten firmly.

SHUTTING DOWN

6. Remove waste cap and place in baton, then put the baton cap in place. Place storage cap on waste bottle and tighten firmly.

7. The baton can be stored directly above the power brick on the right side of the storage compartment.

8. The scale can be placed in the middle of the storage compartment along with the pair of tweezers.

SHUTTING DOWN

9. The grinder and other small parts can be placed in the large storage compartment. Test kits can also be stored in the same compartment.

10. If a shaker is used, it can be placed on top of the large compartment with the shaking mechanism toward the middle of the LightLab.

SHUTTING DOWN

11. The LightLab is now ready to travel. While the device is hardened against bumps and shaking, it is a scientific instrument and should be treated with care when transporting.
    NOTE: If stored for extended periods, store device on its side (as shown in the following picture) to eliminate the chance of solvent leaking from the bottles.

SCALE CALIBRATION

10. Scale Calibration

1. If the scale has been used for more than a month or if the calibration weight does not read between 9.997 and 10.003g then a scale calibration is required. Make sure the scale is on a level surface and there is no significant air movement. Turn scale on and wait until scale reads 0.000g.

2. Press and hold ON button for about 3 seconds until CAL is displayed on screen. Press ON button once more.

3. After a few seconds, the display will flash 10.000. Add the first calibration weight to the scale.

SCALE CALIBRATION

4. After a few seconds, the display will flash 20.000. Add the second calibration weight to the scale along with the first. NOTE: The second weight is included in a bag below the scale in the LightLab box.

5. After a few seconds, the display will read PASS. The calibration is now complete. If the result reads FAIL, repeat all steps again.

LIGHTLAB SETTINGS

11. LightLab Settings

NOTE: All LightLab settings can be accessed by pressing the gear button on the LightLab home screen. The setting screen shown below will appear. Pressing the forward arrow in the bottom right will access additional settings.

REPLACE SOLVENT

When the LightLab solvent runs out, select “Replace Solvent” button and follow instructions to ensure solvent is loaded without air bubbles.

LIGHTLAB SETTINGS

1. Detach waste fluid line and remove waste cap. Remove waste bottle and replace storage cap. Dispose of solvent waste per applicable local or company regulations. Press forward arrow on screen

2. Detach solvent fluid line and remove solvent cap. Remove solvent bottle and replace storage cap. Remaining solvent can be added to waste bottle.

3. Add new solvent and waste bottles and reconnect fluid lines.

4. LightLab will flush for 90 seconds, and will be ready for a new sample once complete.

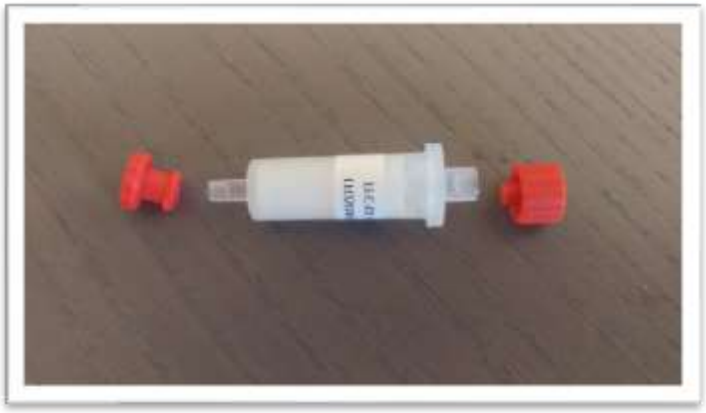
Replace Column

1. The Selective Separation Column will last for 25 tests before replacement is needed. A counter in the upper right corner of the screen shows the number of tests left on the column. Once the counter reaches zero, the column should be replaced. If prompted by the following screen, follow instructions to replace solvent.

LIGHTLAB SETTINGS

2. Remove old column by lifting the column holder arm and then pulling column out of holder. Twisting the column will facilitate removing it.

3. Remove caps on new column and place into column holder.



LIGHTLAB SETTINGS

4. Close column holder onto Selective Separation Column.

5. LightLab will flush new column for 90 seconds, and will be ready for a new sample once complete.

FLUSH SYSTEM

If the LightLab performs poorly, indicates that results were marginal or LightLab solvent does not flow through system, the instrument may need to be flushed. Flushing the system forces solvent through the device at full pressure to dislodge any debris that may be in the fluid lines. Flushing is not required under normal conditions, contact Orange Photonics Support for help if you are having issues with performance.

If it becomes difficult to inject a sample, the input may need to be cleared. Clearing the input forces LightLab solvent out of sample input to dislodge any debris in the sample input lines.

LIGHTLAB SETTINGS

Flushing Forward

1. Optionally remove Selective Separation column from device. In cases where the column is desired to be flushed leave it in place. Removing the column allows higher pressure to force out clogs. Press forward arrow on screen.

2. Close column holder. Press forward arrow on screen.

Press Start button to turn on pump. LightLab will flush solvent for 90 seconds.

LIGHTLAB SETTINGS

Flushing Backward

1. Remove Selective Separation column from device. Press forward arrow on screen.

1. Close column holder. Press forward arrow on screen.

2. Remove sample fluid lines from solvent and waste bottle. Replace with flushing lines. The flushing lines have opposing male and female ends. The solvent bottle should be connected to the OUT on the instrument and the waste should be connected to the IN on the instrument. Press forward arrow on screen.

LIGHTLAB SETTINGS

3. Press Start button to turn on pump. LightLab will flush solvent for 90 seconds.

Clearing Sample Input

1. Remove Selective Separation column from device. Press forward arrow on screen.

2. Close column holder. Press forward arrow on screen.

LIGHTLAB SETTINGS

3. Disconnect the waste line from the waste container. Press forward arrow on screen.

4. Connect waste line to sample input flush port on the side of the instrument. Press forward arrow on screen.

5. Connect Luer end of sample flush line to Sample In port. Press forward on screen.

LIGHTLAB SETTINGS

6. Connect other end of sample flush line to waste container. Press forward on screen.

7. Press Start button to begin flush. The LightLab solvent should come out of the Sample In port and into the waste bottle, forcing any debris in the fluid lines with it.

LIGHTLAB SETTINGS

CHANGE DATE/TIME

LightLab comes with a factory calibrated internal clock that will last for several years. The date, time and time zone may be changed as needed to correct for offsets or new time zones. Daylight savings time is corrected for in the indicated time zones. Press the Home or Settings button to confirm changes.

EXPORT DATA

LightLab has internal storage where test results and diagnostic data are stored. Data from the last 100 tests is stored automatically in internal storage. In addition to the internal storage, there is an external SD card that can store results and data. The SD card is located on the side of the instrument as shown below:

When the SD card is inserted, test results are automatically saved to the SD card in a comma separated value (Excel compatible) format. If the SD card is removed during testing, it is still possible to access test results by using the Export Data function. The Export Data function also allows export of diagnostic data that can be used by Orange Photonics Support to help troubleshoot an instrument. To export data, follow these instructions:

LIGHTLAB SETTINGS

1. Press “Export User Data” to export all test results from the LightLab. NOTE: “Export Diagnostic Data” will export a file that will not be readable by a user. The exported file is intended to be sent to an Orange Photonics support representative and contains raw instrument and diagnostic data.

2. Once selected, the data will be begin to transfer to the SD card. Depending on the number of tests that have been completed this may take a few minutes.

RESET COUNTER

LightLab keeps track of the number of tests that are remaining in the Selective Separation Column. The tests remaining are shown in the upper right corner of each screen. If the counter reaches zero, a prompt to replace the column is displayed when a test is started. Occasionally the counter may be incorrect. To reset the counter to 25 tests, press the Reset Counter button.

DEVICE NAME

LightLab allows a unique name to be created for each instrument. This allows customers with multiple sites to keep track of units with easy names. The device is

shown in the upper right-hand corner of most screens and is saved with any test results. To change the name, press the “Device Name” button and enter a new name.

SUPPORT

If a problem occurs that cannot be corrected using this manual, press the Support button to display Orange Photonics support information. The support screen will also display information that may be useful to the support specialist.

UPDATE

LightLab internal software and calibrations are updated via the User SD card located on the right side of the instrument. Update files are provided by Orange Photonics support and should be placed on the SD card via your computer. Once the SD card contains the update file, insert the SD card into the LightLab. Plug in the LightLab to external power (do not update while operating on battery) and select the “Update” button. LightLab will update and reboot. The process may take several minutes.

LIGHTLAB SETTINGS

SOUNDS ON/OFF

LightLab has audible sounds that indicate when a zero or test is complete. These can be turned off by pressing the "Sounds ON/OFF" button. A beep will confirm that the sound is on when pressed.

PROMODE ON/OFF

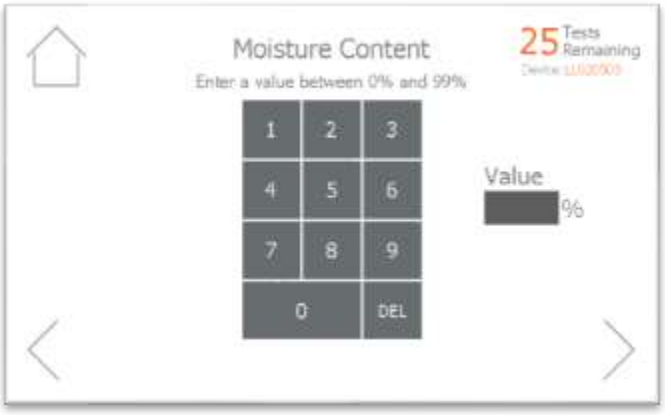
ProMode, when enabled, provides abbreviated on-screen instructions for users that are experienced with LightLab operation. All instructional steps are skipped so that a test can be completed with a minimum number of button presses.

MOISTURE CORRECTION ON/OFF

LightLab allows correction for the moisture content of any plant material. When this setting is enabled, an additional screen will appear that requests moisture content information as shown below. When a moisture content is entered, it will correct the same as if it were completely dry. LightLab will correct the results by adjusting the sample weight to only include non-moisture weight. For example, if a plant that contains 15% THCA by weight has a moisture content of 10%, if 100mg was weighed and entered into LightLab, it will correct the weight to 90mg (100mg*(100%-10%)). The result is a slightly higher value. In our example of 15% THCA, the result will be 16.7% (15%*(100mg/90mg)).

We recommend only using moisture correction if the value is known to avoid inaccurate results. We recommend only using a gravimetric based moisture analyzer for the most accurate results. Moisture correction is available for Flower, Wet Flower (always on), Trim, Raffinate and Custom (always on).

NOTE: if a moisture content >25% is entered, LightLab will require 500mg of sample.



TROUBLESHOOTING

12. Troubleshooting

The LightLab may display an error code that indicates a problem has occurred. Below each potential error code is described along with troubleshooting steps.

ZERO TIMEOUT

Description

To ensure an accurate analysis, a sample must be run within 4 minutes of completion of a zero. If the LightLab is idle for longer than 4 minutes this error will appear.

Causes and Fixes

This is caused by waiting too long after zero has completed before starting a sample. Restart your test to continue.

AIR BUBBLES DETECTED

TROUBLESHOOTING

Description

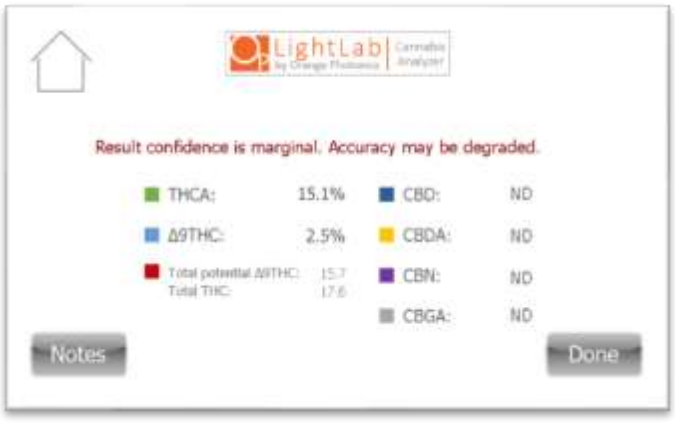
LightLab has integrated air bubbles detection that takes place during system warmup as well as during zeroing, solvent replace and column replace. You may see a warning that air bubbles or drift were detected and the instrument will attempt to remove the bubbles automatically. If the air bubbles cannot be removed after three attempts during zero, the "Zeroing Failed, Air bubbles detected" error will display. This error can occur either during zeroing or sampling. The error indicates that an air bubble was detected that was severe enough to have the potential of causing erroneous results.

Causes and Fixes

1. The solvent may have run out. Check the solvent level, and if it is empty replace the solvent and press "Try Again".
2. If the analyzer has been pumped dry for shipping, or a large bubble was introduced by disturbing the analyzer during analysis, simply press "Try Again". Typically, a second attempt will correct the problem. In rare cases a third attempt may be necessary.
3. The connections may be incorrect, loose or damaged. Check to make sure all fluid connections are tight including the connections at the sample and waste bottles and the column connections. If a fluid tubing is damaged, extra fluid tubing is included. To replace, pull out old tubing from the connectors, cut the new tubing to size and press firmly into the connector barbs.
4. Solvent was replaced without running "replace solvent" program located in settings. Simply press "Try Again" if this was the case. The new zero will provide sufficient sample flushing to reduce the chances of another bubble occurring.
5. Column was replaced without running "replace column" program. New columns are shipped dry, so they need to be flushed with solvent before the first use. On rare occasions, even after sample flushing a bubble may occur. Simply press "Try Again" if this was the case. The new zero will provide sufficient sample flushing to reduce the chances of another bubble occurring.
6. Incorrect sample preparation may also cause this error since very high absorbance may trigger a bubble detection. Make sure the correct amount of sample and solvent were used. If the incorrect sample preparation was completed, the sample will have to be re-extracted.
7. The instrument has a clog. Flush the sample input (Settings → Flush System → Clear Sample Input) and then re-start the analysis. If bubbles are still detected, flush the instrument forward (Settings → Flush System → Flush Forward). If bubbles are still detected, flush instrument backward (Settings → Flush System → Flush Backward). Contact Support if clog persists.

TROUBLESHOOTING

RESULT CONFIDENCE IS MARGINAL/RESULT CONFIDENCE IS POOR



Description

LightLab may indicate that the resulting fit was marginal, and that accuracy may be degraded or that the fit was poor and no results will display. The LightLab analyzes the quality of the results calculated, and if the quality of the fit is not good, an error will be returned. Marginal fit means there could be something wrong, and that the results should not be trusted for critical applications. Poor fit means there is definitely something wrong and the sample must be re-run.

Causes and Fixes:

1. Selective Separation Column is not installed. Install the column and re-run the test.
2. The instrument may have been disturbed during sampling. If this is the case, simply re-analyze the sample. The sample need not be re-extracted, there should be enough extracted sample to re-inject the same sample again.
3. The solvent has run out. Replace the solvent by going to Settings → Replace Solvent, and then re-run the test.

TROUBLESHOOTING

4. The analyzer is cold, or the warmup sequence was skipped or not completed correctly. If possible, move the instrument to a warmer environment, then turn the device off and back on again, and ensure the warmup sequence is completed with solvent and fluid lines in place before running a sample.
5. The Selective Separation Column is too old. If more than 25 tests have been run on the column, replace the column by going to Settings → Replace Column.
6. The sample was not injected, or a bubble was introduced when injecting, or the valve was not set to RUN prior to starting analysis. Re-run sample and ensure that at least 1ml of sample is injected and the valve is set to run before beginning analysis. The sample need not be re-extracted, there should be enough extracted sample to re-inject the same sample again.
7. Sample has unknown cannabinoid or contains other interfering components. In cases where persistent marginal results occur especially for samples that contain significant amounts of other components (tinctures, oils or edibles), the sample may have to be sent to a laboratory for analysis. In addition, this may be caused by plants that were sprayed with significant amounts of pesticides or other plant health products. Contact support if this occurs.
8. The solvent has become degraded. If the solvent cap is left off for long periods (>5 minutes) or has become contaminated, the analysis may result in poor fits. Replace solvent by going to Settings → Replace Solvent.
9. The instrument has a clog. Flush the sample input (Settings → Flush System → Clear Sample Input) and then re-start the analysis. For persistent clogs, flush the instrument forward (Settings → Flush System → Flush Forward), or backward (Settings → Flush System → Flush Backward). Contact Support if clog persists.
10. The flowmeter calibration has become faulty. In rare cases, the flowmeter calibration may become degraded causing marginal or poor results. If persistent marginal or poor results are occurring on multiple samples, contact support.

TROUBLESHOOTING

FLOW WAS TOO LOW/HIGH

Description

LightLab contains a highly sensitive flow meter that controls the flow and pressure inside the system to tight tolerances. If the flow is outside of a range and the LightLab is unable to correct the condition, an error occurs.

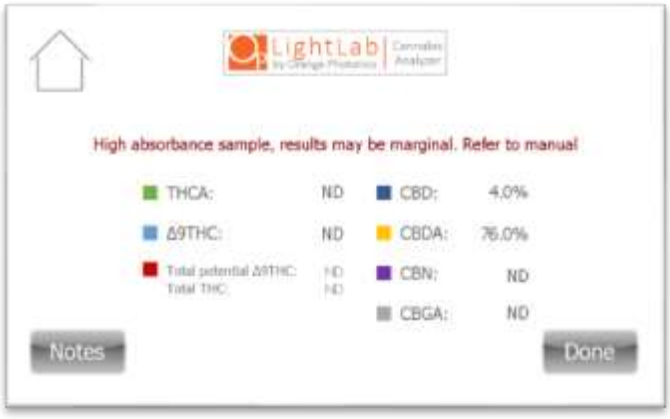
Causes and Fixes:

1. The solvent may have run out. Check the solvent level, and if it is empty press the “replace solvent” button to replace solvent, or access replace solvent from the settings menu.
2. The injection valve was set to “LOAD” during zero. The valve must always be set to “RUN’ during zero sequence.
3. Selective Separation Column is not installed. Install the column and re-run the test
4. The analyzer is too cold or hot, or the warmup sequence was skipped or not completed correctly. If possible, move the instrument to a conditioned environment, then turn the device off and back on again, and ensure the warmup sequence is completed with solvent and fluid lines in place before running a sample.
5. The connections may be incorrect, loose or damaged. Check to make sure all fluid connections are tight including the connections at the sample and waste bottles and the column connections. If a fluid tubing is damaged, extra fluid tubing is included. To replace, pull out old tubing from the connectors, cut the new tubing to size and press firmly into the connector barbs.
6. The solvent has become degraded. If the solvent cap is left off for long periods (>5 minutes) or has become contaminated, the analysis may result in poor fits. Replace solvent by going to Settings → Replace Solvent.

TROUBLESHOOTING

7. The instrument has a clog. Flush the sample input (Settings → Flush System → Clear Sample Input) and then re-start the analysis. For persistent clogs, flush the instrument forward (Settings → Flush System → Flush Forward), or backward (Settings → Flush System → Flush Backward). Check whether solvent is moving through the tubing and into the waste bottle. Contact Support if clog persists.
8. The flowmeter calibration has become faulty. In rare cases, the flowmeter calibration may become degraded. If persistent flow errors are occurring on multiple samples, contact support.

HIGH ABSORBANCE SAMPLE



Description

In rare cases, high concentration samples will cause the instrument to read results outside of the linear range. If this occurs, the confidence in the results will be degraded. The likelihood of this happening is highest with samples that contain high CBDA since it has the strongest signal of the cannabinoids measured.

Causes and Fixes

1. Check to ensure that the extraction was done correctly. Note for concentrates greater than 35% **Three** syringe-fulls (30ml) of solvent are required. If extraction was done incorrectly, re-extract the sample.
2. If extraction was correct, the sample must be re-run after it has been diluted:
    a. Shake extracted sample to ensure it is homogenous.
    b. Remove 5ml of extracted sample and add to a new extraction vial.
    c. Add 5ml of extraction solvent to vial
    d. Shake vial for 10 seconds to ensure it is mixed.

e. Re-run analysis with the diluted sample. Once the results are displayed, multiply results by 2. For example, if the result returns 40% CBDA, the actual concentration will be 80% CBDA.

POWER ON SELF TEST (POST) FAIL

Description

LightLab requires several critical components to operate. When the instrument starts up, critical components are tested during a Power On Self-Test (POST). If any component fails, the instrument will no longer be able to operate and an error will display.

Causes and Fixes

1. The failed component may have simply not powered on correctly. Turn off the instrument, wait 10 seconds and power it back on.
2. The battery level may be too low to power on a critical component. Plug in charger and wait 10 minutes, then try again.
3. The incorrect charger may be plugged in. Replace with original charger and try again. Note LightLab uses a specialized charger and cannot be operated with a standard DC power brick.
4. If a component continues to fail on startup, contact support.

MY RESULTS ARE LOWER/DIFFERENT THAN EXPECTED

Description

LightLab uses a similar technology to laboratory HPLC devices, and typically provides good correlation with laboratory results. There are several reasons that a result may be lower or different than expected described below.

TROUBLESHOOTING

Causes and Fixes

1. The sample preparation may be incorrect. If the weight and/or volume is incorrect, the LightLab result will not be accurate.
    a. Double check the weight and volume added. If it is incorrect, re-extract the sample.
    b. Check scale calibration and re-calibrate if necessary (see Section 10)
2. The extraction may not be complete. This occurs more often with concentrates than flower samples.
    a. Heat is required for most concentrate samples. Skipping the heating step may result in lower than expected results. Flower can be extracted without heat.
    b. After extraction of a concentrate sample, make sure there is no residue or unextracted parts of the sample to be analyzed. In some cases, the heating and extracting may have to be completed more than once to get a good extraction.
    c. Make sure the sample is moved quickly from the heater to the shaker. If the sample is allowed to cool between heating and shaking, the extraction may not complete.
    d. Make sure the sample is shaken for the entire two minutes. More shaking is ok but reducing the shake time may result in poor extraction and low results.
3. The incorrect solvent or bad solvent was used. Never use pure ethanol, grain alcohol, methanol or any other solvents for extraction. When the sample is injected with incorrect solvent, the chromatography will suffer, resulting in incorrect results.
4. The sample may not have been injected into the analyzer completely
    a. Make sure at least 1ml of sample is injected prior to analysis. No air bubble should be injected.
    b. If the samples become difficult to inject, clearing the sample input may be necessary, see Section 11, Clearing Sample Input.
5. For flower, the moisture content of the plant may be significant. LightLab measures weight percent, and plant material will always contain some amount of moisture. If wet plants are being measured, they may need to be dried prior to analysis. There are several methods for drying plant material, contact support if more information is required. Moisture correction is possible with LightLab, see Section 11 “Moisture Correction on/off”

TROUBLESHOOTING

6. If comparing against a laboratory test, there are several reasons the results may differ between the LightLab and the laboratory.
    a. The sample analyzed by LightLab may not be the same as that run by the lab. Cannabis is a natural product with variation between different flowers. We recommend a rigorous sampling method to get the most accurate view of a crop potency level:
        i. Select a "sentinel" plant near the middle of your crop that is a good representation of your plants
        ii. Select at bud from the top, middle and bottom of this plant.
        iii. Homogenize the bud with a grinder and analyze each full bud. Bud weight should be at least 1 gram.
        iv. Average the result from the three buds and use the average as your crop average.
    b. If a sample is to be directly compared to a laboratory, we recommend the following procedure to avoid the variation in sample when comparing laboratory and LightLab results:
        i. Select at least 1-2grams of sample and homogenize using a grinder.
        ii. Collect the correct amount of sample for LightLab analysis and place in a vial.
        iii. Collect the required amount of sample for lab analysis and place in the same type of vial. This should be done at the same time so that no moisture content changes are likely.
    c. The laboratory used may have higher than expected errors. Not all labs are created the same, and low-cost labs may not have rigorous standards for sample handling and analysis. We recommend using a reputable lab that analyzes for potency using HPLC or similar chromatographic methods.
    d. The random error of LightLab and laboratory results may be high enough to cause significant variation. For example, if both LightLab and a laboratory have an error of +/- 1%, a 15% sample may be 14% on the LightLab and 16% from a laboratory. The variation in results will contain both LightLab and laboratory errors.
    e. The sample may have degraded between tests. If the laboratory test was completed much earlier or later than LightLab analysis, the sample may have changed. Note acidic forms of cannabinoids (THCA and CBDA) will degrade into neutral forms (D9THC and CBD). The "Total Potential D9THC" should remain similar unless significant degradation has occurred.

TROUBLESHOOTING

7. When benchmarking your results with industry results, keep in mind that often results shown at dispensaries are inflated. It is extremely rare for a plant to contain >30% cannabinoids (that would mean nearly 1/3 of the plant is cannabinoids- not leaving much for the plant structure, chlorophyll, etc.). Current regulations in several states have loopholes that allow labeled results to be higher than expected. Our experience has shown that high end cannabis can contain 15-25% THCA, and mid-grade contains 8-16% THCA.

COMPLIANCE AND SAFETY INFORMATION

13. Compliance and Safety Information

SAFETY INFORMATION

The use of the LightLab involves solvents and laboratory equipment. Proper understanding of the system and operation is critical to safety. The LightLab solution contains methanol and should be handled with caution. The Safety Data Sheet (SDS) for LightLab solution can be found here:

OrangePhotonics.com/s/SDS.pdf

The following safety considerations should be followed to ensure safe operation of the LightLab:

- Please read and understand this manual before using the LightLab.
- Wear latex or similar gloves and eye protection when using the device
- Never operate the device near or in the same room as open flames.
- Use care when handling LightLab solvent, it contains methanol and is flammable.
- Use the LightLab in a well-ventilated area.
- Dispose of any methanol waste per your state or local laws.
- Never use a LightLab that is damaged or operating erratically. Never use the device for anything but it's intended use.
- Do not open the LightLab, harmful UV rays may be present inside the device.

COMPLIANCE INFORMATION

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with

the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Complies with CAN ICES-3(A)/NMB-3(A)

14. Contact Information

SUPPORT CONTACT INFORMATION

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support@OrangePhotonics.com

Support Hours:
Monday – Friday
8AM – 7PM Eastern (5AM-4PM Pacific)

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