



# International Products

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## HEMP OIL CLEANING

WITH MICRO-90<sup>®</sup>, MICRO<sup>®</sup> GREEN CLEAN, MICRO<sup>®</sup> A07, LF2100<sup>®</sup>, SURFACE-CLEANSE/930<sup>®</sup>, ZYMIT<sup>®</sup> LF, ZYMIT<sup>®</sup> PRO, AND TAP WATER

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### SUMMARY

Micro Green Clean, Micro-90, Micro A07, Surface-Cleanse/930, and Zymit Pro are all effective at cleaning hemp oil under a variety of conditions to suit the customer's needs. The conditions tested in this study include both lower and higher concentrations, different cleaning temperatures, and different lengths of time. A cleaner concentration of 2% at a higher temperature would be the best starting point for establishing the customer's ideal cleaning procedure. In addition, if a low-foaming cleaner is required, LF2100 is recommended. Zymit LF is not recommended for this application.

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### PURPOSE

To determine which of IPC's cleaners can be recommended to clean botanical extracts, particularly hemp oil.

### INTRODUCTION

All of IPC's cleaners were tested to determine their cleaning efficacy towards removing hemp oil, a botanical extract. Tap water was also used as a control. Different variables were tested to decide the optimal cleaning conditions for each cleaner. These variables include cleaner temperature, length of cleaning time, and cleaner concentration.



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## EXPERIMENTAL

### 1. Materials and reagents

- a. Virgin cannabis sativa hemp oil (Zatural)
- b. Micro Green Clean lot #180111
- c. Micro-90 lot #190717
- d. Micro A07 lot #180914
- e. Surface-Cleanse/930 lot #190403
- f. LF2100 lot #190529
- g. Zymit Low Foam lot #190808
- h. Zymit Pro lot #180216
- i. Tap water
- j. Polypropylene Tupperware containers
- k. Lab balance (Mettler Toledo)
- l. Pipette

### 2. Procedure

- a. Day 1:
  - i. Weigh polypropylene Tupperware container
  - ii. Add ~1 mL hemp oil & weigh
  - iii. Close container and use next day
- b. Day 2:
  - i. Heat up tap water to usage temperature
  - ii. Make 200g of each cleaning solution
  - iii. Add solution to polypropylene container
  - iv. Swirl 10 times
  - v. Wait 30 minutes (or other period of time)
  - vi. Swirl 10 times
  - vii. Pour out solution
  - viii. Rinse with ~150 ml tap-cold water by swirling 10 times
  - ix. Air dry
- c. Day 3:
  - i. Weigh polypropylene container
  - ii. Calculate oil removal

### 3. Variables

- a. Different cleaning variables tested for efficacy were concentration (0.5%, 1%, 2%, and 4%), temperature (26°C, 35°C, and 48°C), and time (5 minutes, 10 minutes, 20 minutes, and 30 minutes).



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## RESULTS

### 1. Temperature

- Various temperatures (26°C, 35°C, and 48°C) were tested with each cleaning product at 2% for 30 minutes.
- The cleaning solutions were heated to the desired temperature but were not maintained at that temperature during testing.
- Generally, the higher the temperature, the better the detergent will clean, as shown in figure 1.
- The temperature can be raised higher than what was tested, 48°C, with caution being taken to avoid splashing and burning the operator. Enzyme cleaners cannot be heated above 60°C.

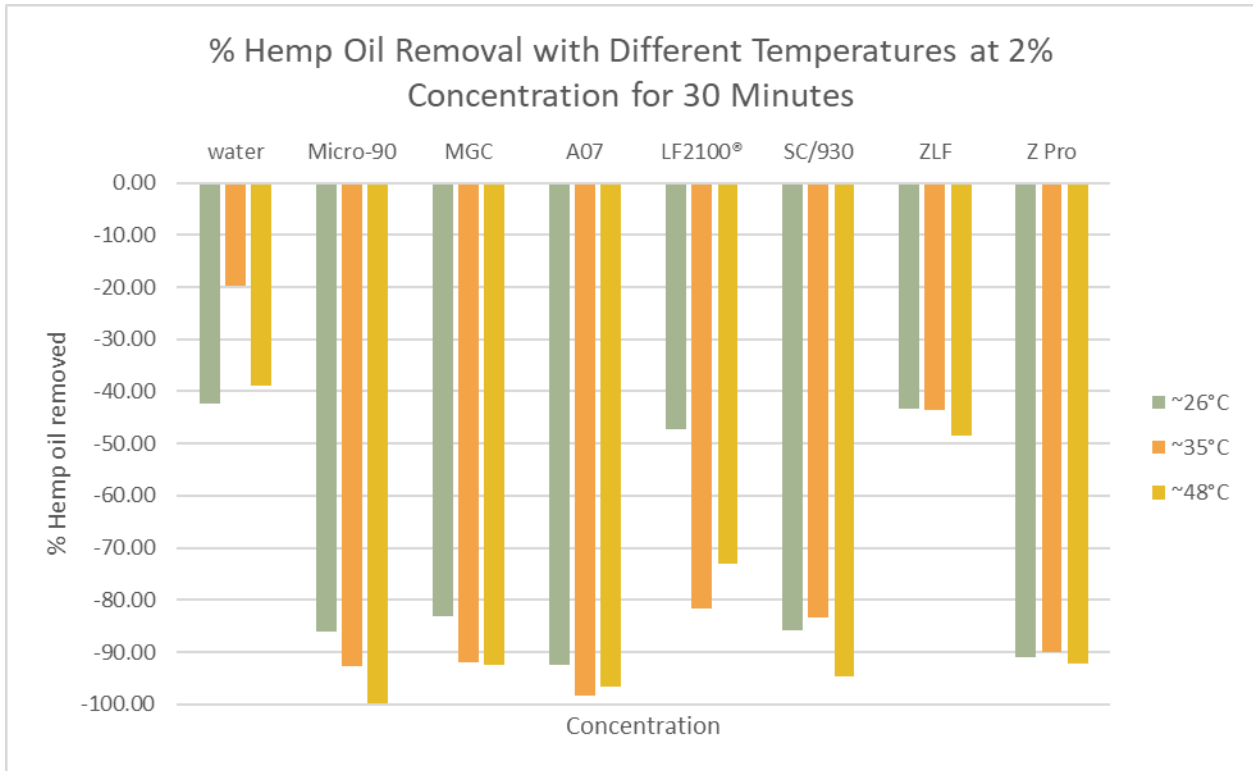


Figure 1. Percent hemp oil removal of each cleaner at different temperatures.



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## 2. Concentration

- Various concentrations (0.5%, 1%, 2%, and 4%) were tested with each cleaning product at 26°C for 30 minutes.
- Figure 2 shows that even a low cleaner concentration can work well at removing hemp oil.
- The data for 2% was taken from figure 1; it was not tested with the same batch of soil.

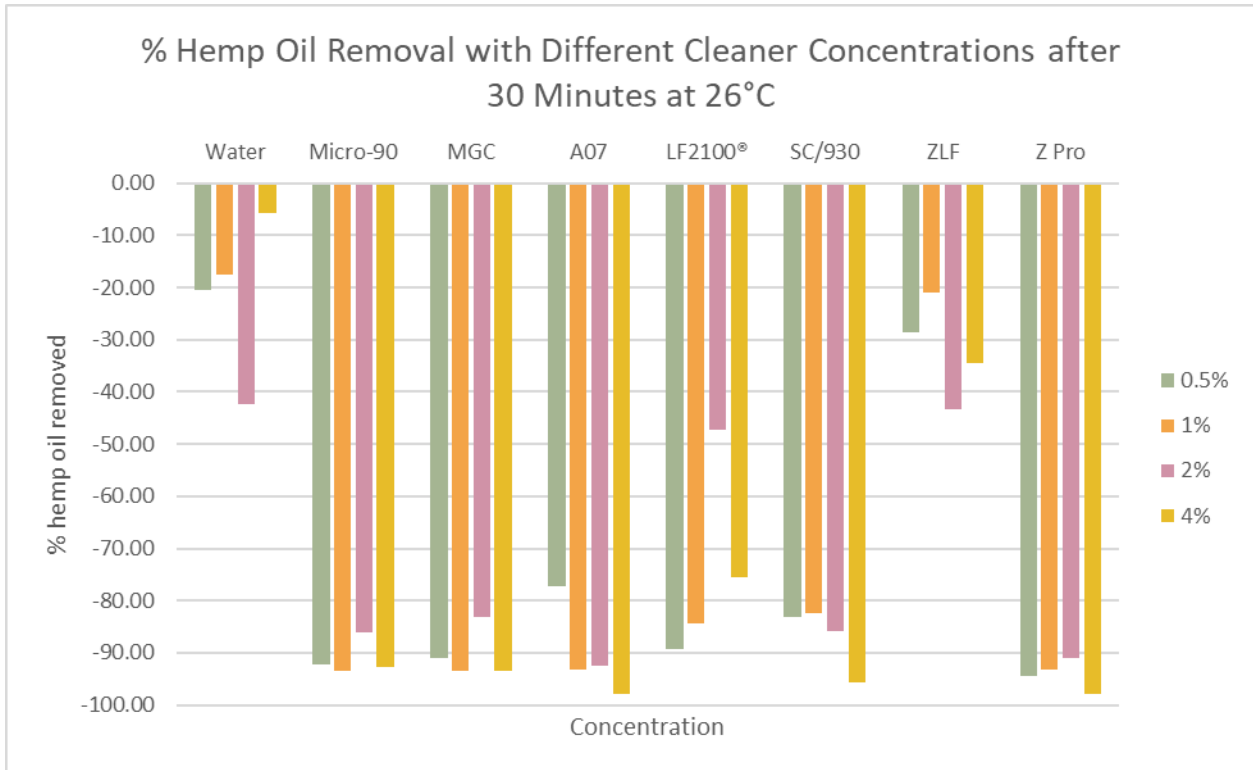


Figure 2. Percent hemp oil removal with different cleaner concentrations.



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### 3. Time

- Various lengths of time (5, 10, 20, and 30 minutes) were tested with each cleaning product at 2% and 26°C, as shown in table 3.
- The data for 30 minutes was taken from figure 1; it was not tested with the same batch of soil.

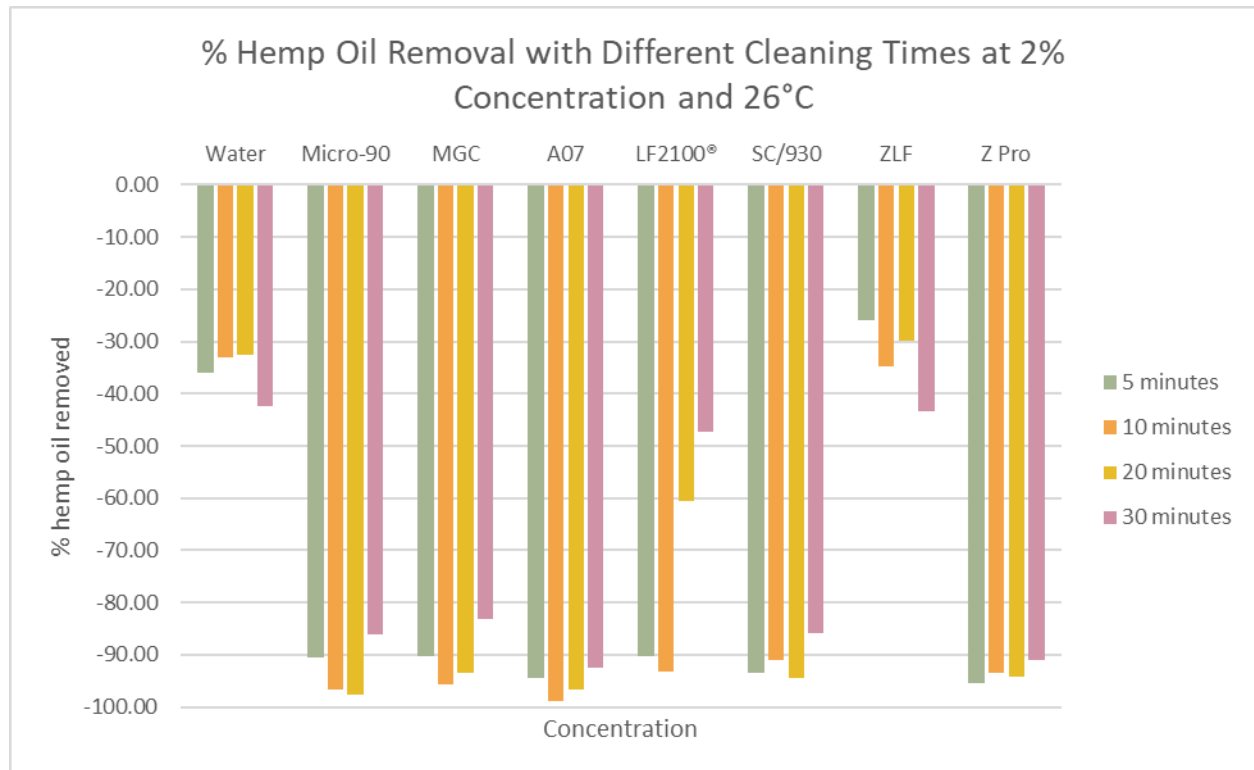


Figure 3. Percent hemp oil removal with different cleaning times.

## DISCUSSION

- The botanical extract soils will likely be more difficult to clean in a real-world manufacturing setting.
- To determine the customer's optimal cleaning parameters, it would be best to start with a cleaner concentration of 2% at a higher temperature, with caution being taken to avoid splashing and burning the operator.
- Micro-90 and Micro Green Clean are similarly effective for every variable tested. In addition, Micro A07, Surface-Cleanse/930, and Zymit Pro each worked well.
- LF2100 is recommended if a low foaming cleaner is required.
- Zymit LF is not recommended for this application.