

BOTANICAL HERBAL OIL EXTRACTION

SAFETY FIRST



Congratulations for selecting BHOgart botanical herbal oil extraction equipment to effectively extract essential oils and extracts from herbal materials using light-hydrocarbon solvents. This equipment, pending the model, is specifically designed for the use of LPG (butane, or propane-butane mixes) as the extraction solvent. LPG avoids the need to use extreme temperatures or pressures in the extraction process and is removed from the extract with basic evaporation techniques.

Easy and **S**afe: BHO Extraction can be easy and safe, but all equipment operating and maintenance instructions must be followed and all safety requirements for the facility and equipment usage must be fulfilled. Carelessness can quickly lead to a serious fire or explosion and grave or fatal injuries.

Emergency **S**hutdown: At any time if something seems wrong – STOP and be quick to SHUTDOWN PUMPS and CLOSE VALVES to isolate components until the problem can be resolved. If a leak is getting out of control or starts burning, it is better to RUN and CALL 911 than to be injured.

Safety Considerations

Flammable: LPG (liquefied petroleum gas: propane, butane, and their mixes) is extremely flammable and can create an explosive atmosphere when mixed with air. LPG becomes explosive at as little as a 2% content with air. Keep away from open flames, heat, sparks, and hot surfaces - no smoking.

Leaks: Although BHOgart extractor systems are closed-loop type designs intended to operate without leakage of the LPG, and will recover the solvent after extraction for reuse, some release of LPG must be expected and planned for. The herbal materials may retain some LPG depending on how thoroughly vaporized after extraction, which may be released upon removal from the unit. Some process steps may release a small amount of LPG, as when purging air from a hose. One must plan on the possibility of an operating error or improper seal allowing an outright LPG leak. Equipment must be configured with shutoff valves on every nozzle of every pressure vessel to permit quick isolation of every component.

Heavier-than-air: LPG is heavier-than-air and will sink down to the floor or ground and collect in low areas, corners, basements and crawl-spaces. The basic rule is never allowing an accumulation of LPG at even one-fourth the explosive mix, or less than ½% - that is very little. You cannot smell LPG if not odorized.

Ventilation: The key to safety when extracting using LPG is proper ventilation. Where permitted, operating the extractor system outdoors in an open area away from walls or low spots and away from any sources of ignition is one way to improve safety. Where necessary to operate indoors, a properly designed hazardous environment facility must be used, with proper exhaust ventilation for LPG, proper explosion-proof electrical and fire safety equipment, and proper storage of the LPG supply.

PPE (Personal Protective Equipment) is vital for operator safety. Proper gloves and eye or face protection are always necessary. Clothing should cover all flesh and be rated FR for Flame-Resistant (ref NFPA-2113). Besides a flash fire hazard, compressed LPG upon release is very cold and can cause immediate frostbite of any exposed flesh. In addition to an explosion hazard, concentrated LPG can displace air in a confined space and cause asphyxiation without warning. Indoor facilities should have LPG gas detector devices to warn of a leak or developing hazard. A breathing respirator with proper filters may be warranted.

Equipment: Electrical equipment within the hazardous area should be rated explosion-proof or intrinsically-safe and be grounded if required. Exhaust ducting should be rated conductive and be grounded and exhaust fans should be rated for LPG. The recovery pump should be rated suitable for LPG and set-up not to exceed the pressure rating of the recovery tank. The vacuum pump needs to be suitable for LPG and vented safely unless only venting air or preceded by a separator device to remove the LPG before the pump. A facility should have firefighting equipment ready, at least a portable extinguisher and perhaps a sprinkler or automated extinguishing system. LPG gas detection equipment should be used to alert of pending danger and perhaps run ventilation equipment.

Safety **V**alves: Pressure vessels come with pressure relief safety valves, to prevent an excessive gas pressure build-up. They are set to the vessel pressure rating and must not be removed. Accessories, pipes and hoses exposed to liquid LPG must be equipped with a hydrostatic relief valve between any two shutoff valves, to release pressure from liquid expansion due to warming. They are set to 450psi and must not be removed, and need to be added to any new hose or pipe run.

Regulations: Local and state regulations for the facility need compliance, starting with local building and fire codes, which often refer to national codes like NFPA and government regulations like OSHA. For reference, an LPG solvent extractor system location is likely classified a Class 1, Division 1, Group D explosive atmosphere hazardous area. Check with your local Fire Department.

Standards: The design standards for equipment and facilities, and the standard procedures for LPG storage and operating equipment, have been developed to minimize dangers and improve safety. Always ensure all pressure is released before opening a closed vessel, pipe or hose. Inspect the equipment frequently and replace worn gaskets and hoses and any questionable clamps or fasteners. Keep the equipment clean.

Please give safety it's proper due, so you can best enjoy the fruits of your labors. Make it **SAFETY FIRST**.

From MSDS – Material Safety Data Sheet – for LPG

First-aid measures:

After inhalation	Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
After skin contact	For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensations have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.
After eye contact	Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Get immediate medical attention.

Firefighting measures:

Suitable extinguishing media: Carbon dioxide, dry chemical, water spray or fog.

EXTREMELY FLAMMABLE GAS. Forms explosive mixtures with air and oxidizing agents.

EXTREMELY FLAMMABLE GAS. If venting or leaking gas catches fire, do not extinguish flames as flammable vapors may spread from leak, creating an explosive re-ignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering a confined area, check the atmosphere.

Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so.