Industrial Hygiene Evaluation of Botanical Extraction Systems – A Brief Overview

Presented by:

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What is Botanical Extraction?

• Marijuana flowers or plant waste is extracted typically with either CO\textsubscript{2} or a flammable solvent/gas

• The Colorado Marijuana Enforcement Division has promulgated rules as guidelines for safe extraction methods

• A CIH and/or PE is required to oversee implementation of these guidelines in order for an extraction lab to receive certification and licensing to operate under State Law

• Illegally “cooked” in makeshift labs often results in fire or explosion of flammable butane or alcohol

• The concentrate may be smoked or more commonly used to infuse edibles

• CDPHE has a multi million dollar grant allowing current research by UC Medical which may prove additional medical benefits of non psychoactive extracts
Why the Concern About Extraction Labs?

• Danger of fire and explosion

• Butane LEL 1.8% or 18,000 ppm

• Flammable gas monitoring is required
Inhalation of solvents

• Butane/CO$_2$ are not simple asphyxiants. The Threshold Limit Value (TLV) for an occupational exposure to Alkanes (C1 – C4) is 1000 ppm.

• Therefore flammable gas alarms need to have a dual point alarm, one @ 50% of the TLV and a second at 25% of the LEL.

• CO$_2$ has a TLV of 5,000 ppm and is not flammable. Alarms at 50% of the TLV are needed.
Employee Exposure Monitoring

• Per OSHA standard 29 CFR 1910.1000 personal exposure monitoring should be conducted once the extraction system has been permitted by the City and is in production mode
How is Hash Oil Produced?
• Typically one to three pounds of weed are placed into a stainless steel cylinder

• The solvent of choice is run through the cannabis and an apple cider colored liquid is produced

• This liquid is evaporated to yield a paste or oil

• Approved solvents include propane, butane, heptane, IPA, ethanol, acetone & CO2

• In the rulemaking process we required that this process be “green” meaning that solvents must be recycled
Different types of cannabinoid extractions

- Kief (mechanical)
- Bubble hash (ice water)
- Amber glass (CO2)
- Shiva Crystals (dry ice)
- Hash oil (solvent)
- Hash oil tincture

Courtesy of the Denver Environmental Health
The Solution to Solvent Buildup is Exhaust Ventilation

- Exhaust systems for extraction labs require 1 cfm/ft\(^2\) of floor space per NFPA and Denver Fire

- I recommend 3 cfm/ft\(^2\)

- Exhaust fans/motors are required to be explosion proof

- I recommend that operation of the exhaust system be tied into the extraction lighting, thereby preventing extraction without exhaust
Other Health and Safety Considerations

- Flammable gas storage
- Written H&S Program
- PPE
- OJT
- MSDS
- Emergency Plan
- Fire Extinguisher Training
Appropriate Regulations for Extraction Labs

- CDPHE launched the colorado.gov/marijuana website

- Denver has a marijuana division within the Fire Department

- Chief Gonzales, Division Chief, Fire Prevention Division with Denver Fire has a guidance document that can be found at dfdfpb@denvergov.org