

Benefits of using multiple absorbers for effective odor control throughout the cannabis growing cycle

Abstract

Dry absorbent chemical media offers an efficient solution for elimination of contaminant and odorous gases generated from cannabis plantations, processing and consumption. The most commonly used absorbent is virgin activated carbon, which is efficient in the elimination of most high molecular weight VOC. However, it is not effective in the removal of many other gases, such as aldehydes, myrcene and other generated alkenes.

These type of compounds can be removed by breaking the double bond via chemical reaction with a strong oxidant, such as potassium permanganate, instead of physisorbed at virgin activated carbon surface. For this reason, a combination of virgin activated carbon and a media containing a strong oxidizing agent, such as potassium permanganate is recommended to ensure the removal of all the gases involved.

1 · Introduction

There are three main focusses regarding air quality improvement in relation to cannabis:

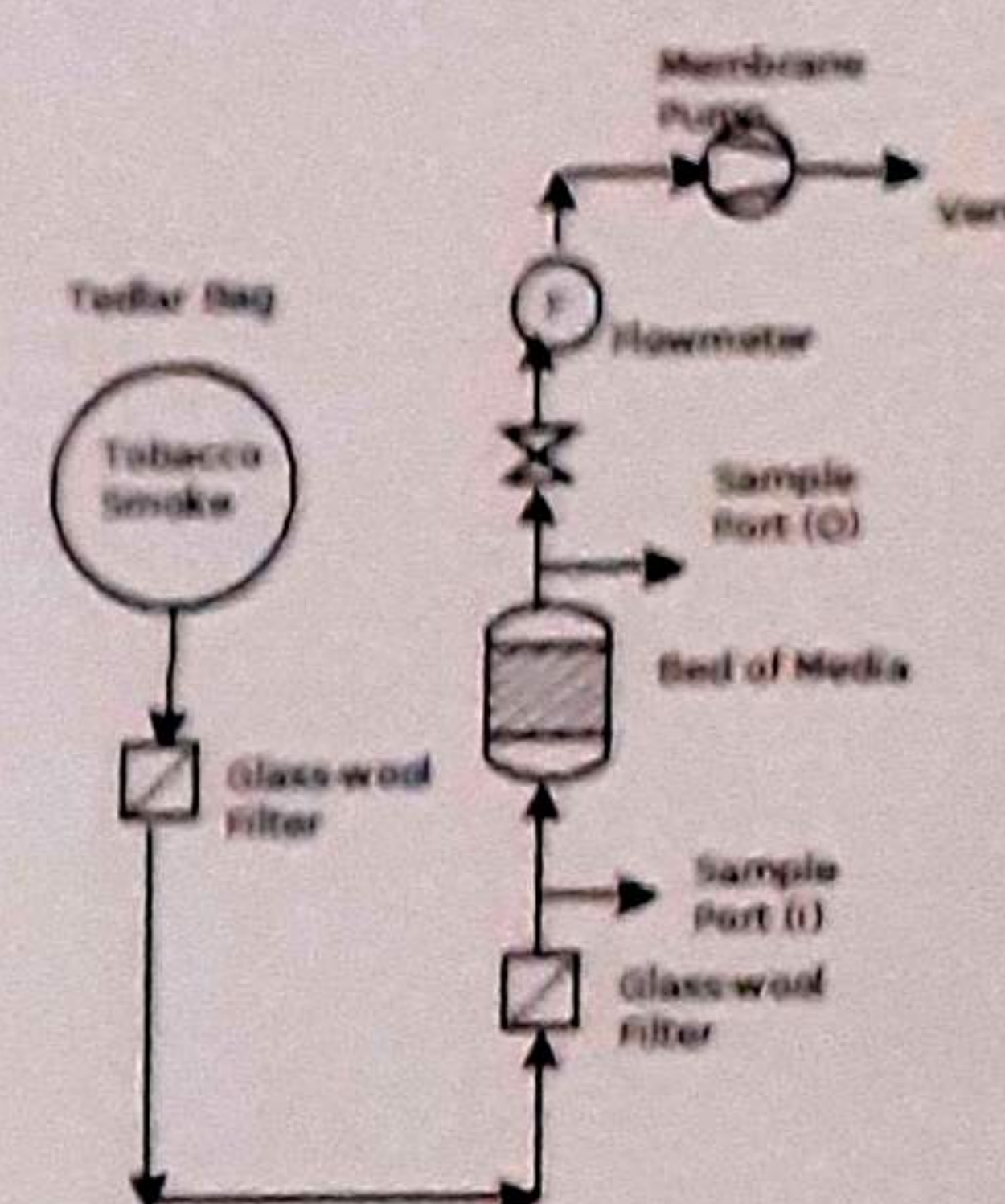
- emissions from cannabis plantations to mitigate odor issues and environmental contamination. From the 760 Tg (C) of VOC are generated in the cannabis plantation per year, the main constituents are isoprene (70%), monoterpenes (11%), and sesquiterpenes (2.5%).
- indoor air quality improvement by elimination of outdoor pollutants to protect the plant growth,
- removal of odorous and contaminant gases related to smoke from cigarettes and cannabis consumption, in smoking facilities.

Many of the gases associated with cannabis plantation and consumption are also present in tobacco smoke. A laboratory test was performed with tobacco smoke to find the most effective absorbent media to eliminate all related gases.

2 · Materials & Methods

The test column was 1.6 cm diameter, with a 2 cm high media bed, and a media volume of 4 cm³. The target gas was collected in a Tedlar bag and then injected into the testing column, passing through the media bed in the testing column at a flow rate of 3800 cm³ min⁻¹.

The concentration of the filtered gas was regularly checked using a gas chromatograph coupled with a mass spectrometer.



3 · Results & discussion

The combination of a media which removes gases by physical adsorption (BION AC), and another media type which acts by chemisorption (BION ISORB MAX) offers several advantages compared to the use of solely virgin activated carbon.

The oxidant-based media (BION ISORB MAX) provides improved performance, longer lifetime, and better efficiency.

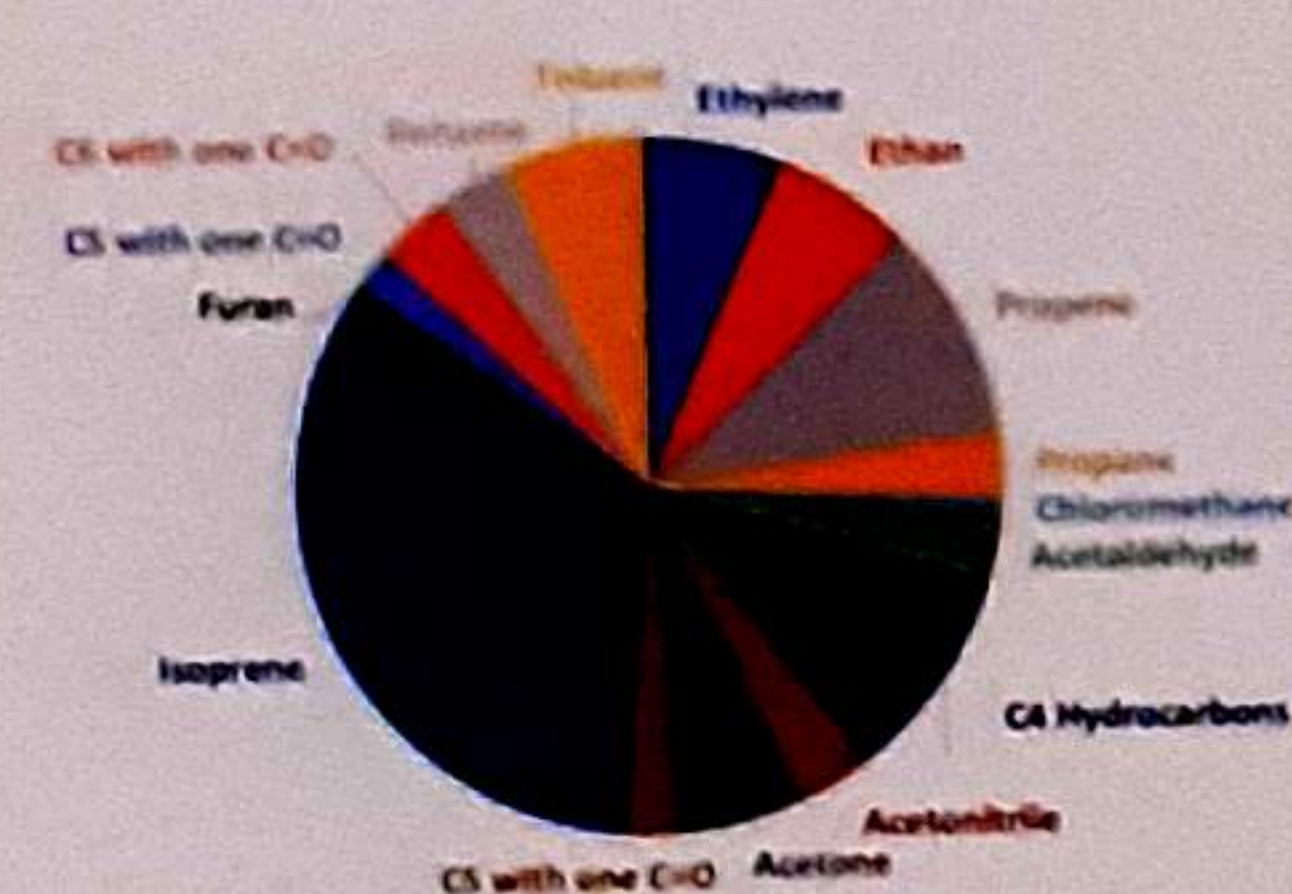
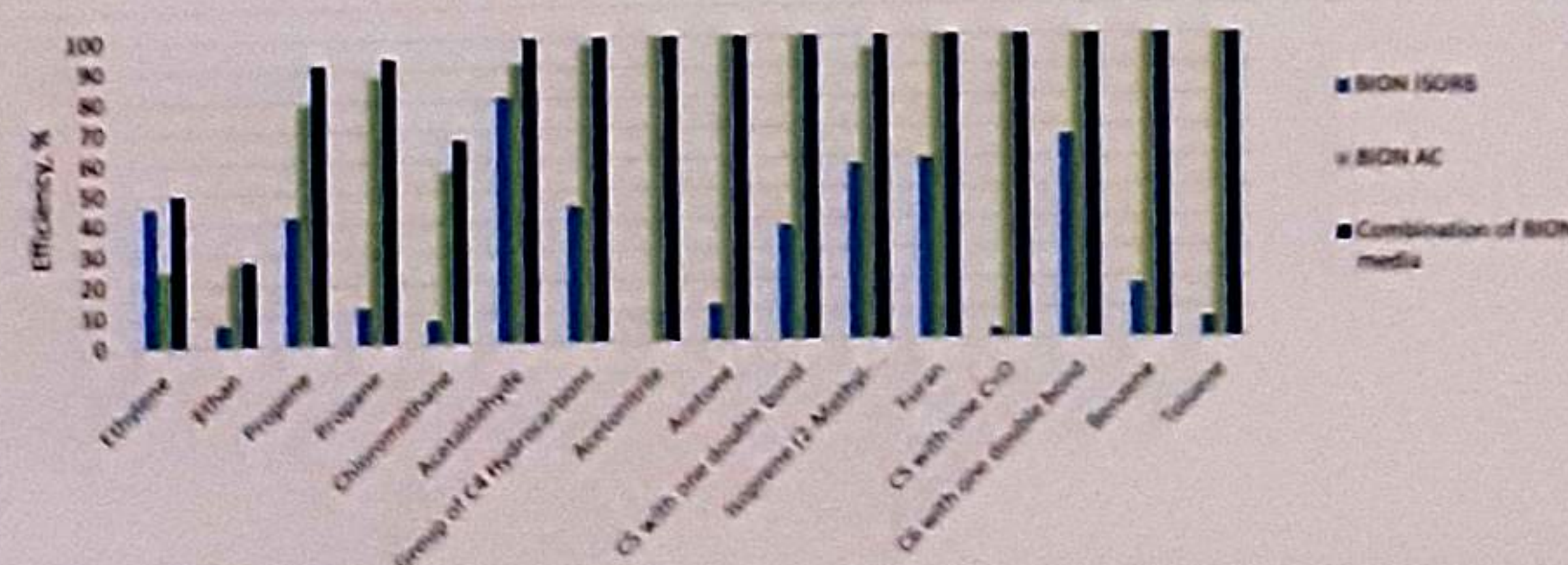


Figure. Composition of the target gas analyzed in the chromatograph (percentage).



Graphic. Efficiency of the BION media in the elimination of the gases found in tobacco smoke: A) using an oxidant-based media (BION ISORB); B) a virgin carbon media (BION AC); and C) a combination of both (BION ISORB and BION AC - BION DELTA MAX).

By adding an oxidant-based media (BION ISORB MAX), which eliminates the gaseous compound by irreversible chemical reaction, the desorption associated with physical adsorption is avoided together with the unpleasant odors coming from the filters after some time of usage.

BION ISORB (Chemisorption Based Media)	Activated Carbon (Adsorption based media)
Irreversible	Reversible (desorption is possible and thus generation of unpleasant odors)
Independent of moisture of the air and of room temperature	Dependent on moisture at high relative humidity values. Strongly dependent on room temperature.
Media performance is quite independent on pollutant concentration especially at low "real world" concentrations	Strongly dependant on pollutant concentration (as lower the pollutant concentration the worst is the media performance)
Independent of the molecular weight of the pollutant.	Better for heavier pollutants.

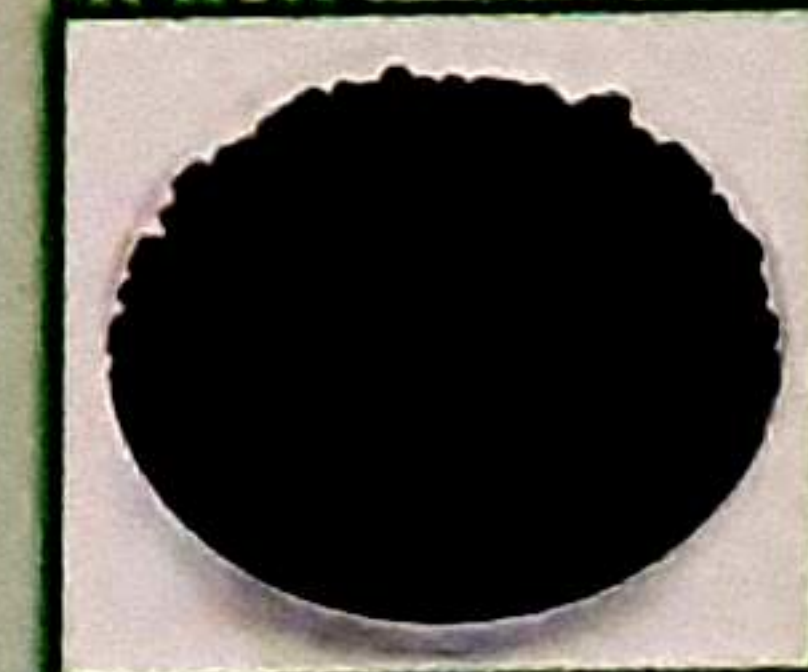
Table. Comparison of the advantages and disadvantages of the use of virgin activated carbon (BION AC) and a permanganate containing media (BION ISORB).

Conclusions

The use of dry chemical absorbers is effective towards the elimination of most gases generated from tobacco smoke and associated with cannabis plantations, preventing the VOCs emissions to the atmosphere and contributing to the fulfilling of odors and contaminant emission regulations.

The addition of an oxidant-based chemical media absorber combined with activated carbon-based media, increases the efficiency in the removal of several compounds in the target gas. According to the laboratory tests, the best performing solution is a combination of an oxidant media (BION ISORB MAX) and one or two activated carbon-based media.

BION AC



BION BLEND

