DESERT BREEZE

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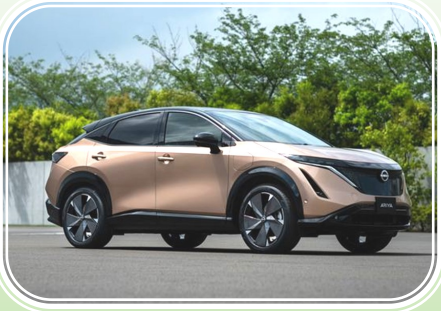
ELECTRIC VEHICLES

The Department of Energy Vehicle Technologies Office publishes a Fact of the Week (FOTW). One may opt to receive the Fact of the Week by electronic mail. On occasion the reader may be drawn to read beyond the subject line, and open the Fact. Ironically, the more interest generated by a FOTW, the more energy is consumed reading about it. A recently published FOTW #1144 states the energy "saved" (because of increased efficiency; but, perhaps, it is better described as "offset"- because energy is still consumed) from adoption of Plug-in Electric Vehicles (PEVs) is estimated to be 44.8 Trillion Btu in 2019. An increase of 47% from 2018. You may have read previously in a Desert Breeze issue, that Electric Vehicle (EV) adoption is increasing. These new figures support the notion that EV use is becoming more widespread.

Many new Electric Vehicles will be coming into market in the next couple years. In the past, non-Tesla electric vehicles have not enjoyed the same level of marketing and sales support as other vehicles. The time for a change is now; and, manufacturers are rushing to develop electric cars and differentiate products.

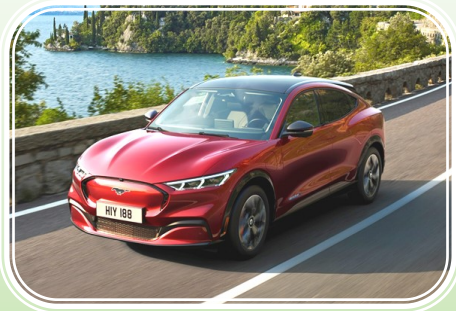
Promotional language to describe new products is noticeably evolving, emphasizing more technological features and performance advances. Examples of the new promotional language is provided below, with the caveat that this is but a small subset of the total population and only provided for illustrative purposes. More examples, and more models may be included in upcoming issues of the Desert Breeze. This is not an endorsement of any product. The language is reproduced here only for illustration of the change coming to the automotive industry.



NISSAN ARIYA: COMING 2021 — The dawn of a new era — Force of wonder.

Introducing an electric crossover from Nissan. It's the purest expression of Nissan Intelligent Mobility. A force to unlock the power within. You. Me. All of us. Moving beyond with capability, precision and style. Refined minimalism on the horizon – ARIYA is the stunning expression of NISSAN'S NEW VISION.

A single horizon line replaces fussy contours. New thin LED headlights shine at night, then disappear during the day. The final touch? A new illuminated badge to light the way forward. The excitement of moving in a new way. The awe of breakthrough innovation – The rise of the electric crossover.



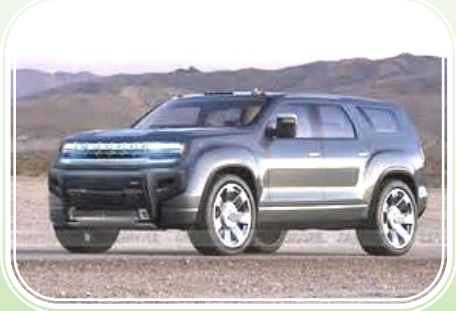
FORD: 2021 ALL-ELECTRIC MUSTANG MACH-E

THE FUTURE OF EXHILARATION

300 MI, MID 3-SEC, EXT RANGE-RWD-61 MILES IN 10 MIN-DC FAST CHARGER

"AN ELECTRIC NEW ADDITION TO THE MUSTANG FAMILY "

Built from all the passion of its iconic heritage, Mustang Mach-E is a new shape of freedom. Get ready for 0-60 thrills with zero emissions. Available Late 2020 – UNBRIDLE YOUR DRIVE



GM: HUMMER EV, FULLY CHARGED. FULLY ELECTRIC. READY TO CHANGE THE GAME FOREVER.

The Quiet Revolution will electrify the world. Get ready for the world's first all-electric super-truck. The First Ever GMC Hummer EV. Reveal & Reservations Fall 2020. UP TO 1,000 HORSEPOWER. UP TO 11,500 LB-FT OF TORQUE – 0-60 MPH IN 3 SECONDS

The First Ever GMC HUMMER EV has zero limits, and our open-air design provides powerful proof. For the unique open-air experience, easily remove the four roof panels and front T-bar to let the world in. We'll continue to keep you informed as we prepare to show the world our revolutionary all-electric, zero emissions, zero limits supertruck.

By: Brenton Smith

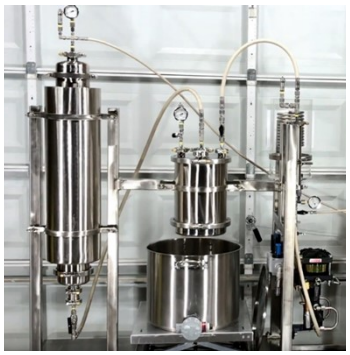
CANNABIS: Oil Extraction Part 3 of 4

In the last Desert Breeze article, we talked about the Eastern Kern Air Pollution Control District's (District) involvement in permitting cannabis cultivation activities. In this edition of Desert Breeze, we will focus on the cannabis oil extraction process, the air contaminants emitted during this process, and best available controls for mitigating the release of these air contaminants.

In recent years, cannabis concentrates, commonly referred to as cannabis extracts have become more desirable. Cannabis extracts are significantly more potent than standard cannabis buds and can be used in a variety of consumer products including gels, gummies, oils, supplements, ointments and more. The demand for cannabis concentrates has led to the development of various extraction techniques. Extraction of cannabis can be classified into two main categories: solvent extraction and solvent-free extraction. Solvent-free extraction is used for lower scale applications and uses more basic techniques for extracting cannabis including grinding and sieving. For the scope of this article we will focus mainly on solvent based extraction including propane, butane, and ethanol extraction. These three solvents are made up of Volatile Organic Compounds (VOC), a regulated air contaminant. Hence, the District has recently been involved in regulating such activities.

Ethanol Extraction as the name implies, uses ethanol as the base solvent. This process is conducted in a specialized centrifugal extractor that essentially works like a washing machine. The plant material is placed inside a permeable bag and loaded into the extractor. Ethanol is then introduced, soaking the cannabis material and removing essential oils. The liquid ethanol/oil mixture is then drained back into a holding vessel. The remaining solvent is drained out via the "spin cycle" using centrifugal force to remove up to 97% of liquid ethanol from the spent plant material. The next step is to separate the ethanol from the concentrate oil. This is accomplished by some form of evaporation, usually using a vacuum system, since ethanol evaporates at pressures lower than atmospheric. This leaves behind the concentrate product which can be further refined depending on client needs. One of the biggest challenges with ethanol extraction is the polarity of ethanol, meaning it has a tendency to mix with water and dissolve molecules like chlorophyll. Removing the chlorophyll from the extract produces an undesirable, bitter flavor. On the other hand, ethanol has no risk of leaving toxic residual chemicals in the final cannabis extract. Ethanol is derived from high starch content crops and has been classified by the FDA as safe for human consumption.

Butane/Propane Extraction is used to create a product known as butane hash oil (BHO). To do this, cannabis material is "washed" using liquid propane or butane in a pressurized and heated system. Similar to ethanol extraction, the concentrate and solvent are separated via evaporation. The solvent/concentrate mixture is heated or placed under a vacuum, thus separating the two via evaporation. Recovered solvent is then compressed or chilled back to liquid form and reused as needed. This process is conducted in an explosion proof room using a closed loop extraction system capable of recovering up to 97% of deployed solvent. At this point, the extracted material referred to as "shatter" or "crude", which typically includes THC, CBD and other chemical components, is placed inside vacuum ovens to further remove trace solvents. The residual butane/propane content is usually regulated by state agencies. The advantages of butane or propane extraction is that these solvents are non-polar, meaning chlorophyll is not extracted, leading to a more desired product. However, butane and propane burn easily in its gas phase, which poses a serious risk of the gas exploding. In addition, propane and butane often contain toxins that are harmful to humans. That danger makes this method a less desirable choice, especially for medicinal products. Hence, production using butane or propane often requires increasing analytical testing and is subject to tighter regulations on acceptable residual butane/propane levels. Nonetheless, butane extraction has been the most popular extraction method for years, largely due to the relatively low equipment and running costs.



Propane, butane, and ethanol solvents are made up of hydrocarbons classified as VOCs. VOCs contribute to air pollution via ozone formation, see the September 2017 issue of the Desert Breeze for more information on ozone formation. Additionally, the strong odors associated with cannabis processing can negatively affect the surrounding community and cause a public nuisance. Thus, District Rules require cannabis extraction facilities to be constructed/equipped with best available control devices. Extraction using solvents is conducted using a closed-loop process. This means nearly all solvent deployed is recovered and returned to the initial point (storage vessel). Additionally, ventilation systems for extraction and processing rooms are vented though a carbon filtration system. This means VOC compounds physically adhere to the activated charcoal surface. As mentioned in the last article, cannabis plant material releases natural aromatic hydrocarbons called terpenes. Terpenes are also classified as VOC, however, emissions from cannabis matter (dry leaves, stalks, and flowering buds) tend to be substantially lower than that of flowering plants. Cannabis extraction operations are required to obtain an Authority to Construct (ATC); this provides an air pollution pre-construction review and ensures the facility is equipped with adequate air pollution control devices.

By: Miguel Sandoval

Pollutant of the Quarter: Styrene

What is Styrene? Styrene is a colorless liquid that evaporates easily. In its pure form, styrene has a sweet smell. Manufactured styrene may contain aldehydes, which give it a sharp, unpleasant odor. Styrene is primarily a synthetic chemical that is used extensively in the manufacture of plastics, rubber, and resins. It is also known as vinylbenzene, ethenylbenzene, cinnamene, or phenylethylene. Many workers, including those who make boats, tubs, and showers, are potentially exposed to styrene.

Is Styrene toxic? The short answer: Yes. Everything is toxic; it is just a matter of dosage. Water can kill you with a high enough dose. However, the United States Environmental Protection Agency (EPA) lists styrene as a hazardous air pollutant and the chemical is also on the California Office of Environmental Health and Hazard Assessment (OEHHA) Proposition 65 list (chemicals known to the state to cause cancer or reproductive toxicity).

However, let's examine how you can be exposed to styrene and the corresponding potential for harm. Large amounts of styrene are produced in the United States. Small amounts are produced naturally by plants, bacteria, and fungi. Styrene is also present in combustion products such as cigarette smoke and automobile exhaust. As stated previously: Styrene is widely used to make plastics and rubber. Some consumer products that contain styrene include:

- packaging materials (e.g. packaging "peanuts")
- insulation for electrical uses (i.e., wiring and appliances)
- insulation for homes and other buildings (extruded insulations)
- fiberglass, plastic pipes, automobile parts
- drinking cups and other "food-use" items
- carpet backing

These products mainly contain styrene linked together in long chains (polystyrene). However, most of these products also contain a small amount of unlinked styrene. Styrene can be found in air, soil, and water after release from the manufacture, use, and disposal of styrene-based products. Styrene is quickly broken down in the air, usually within 1–2 days. Styrene evaporates from shallow soils and surface water. Styrene that remains in soil or water may be broken down by bacteria or other microorganisms.

The most common way you can be exposed to styrene is by breathing air containing it. Therefore, looking at the list above, the big exposure items are: cigarette smoke, automobile exhaust, use of photocopiers, and working in industries that use or manufacture styrene (e.g. extruded polystyrene and fiberglass manufacturing plants). Rural or suburban air generally contains lower concentrations of styrene than urban air. Indoor air often contains higher levels of styrene than outdoor air. Common levels of normal styrene exposure are:

0.06–4.6 parts per billion (ppb) in outdoor air
0.07–11.5 ppb in indoor air

You want to limit your exposure to styrene. Avoid cigarette smoke and automobile exhaust, and spend time outdoors to breathe "clean" air.

By: Glen Stephens

Eastern Kern 2015 RACT SIP

Stratospheric ozone occurs naturally and is beneficial in the upper atmosphere, where it shields the earth from harmful ultraviolet radiation from the sun. In contrast, ground-level (tropospheric) ozone (O_3) is a colorless gas with a pungent, irritating odor and is a highly reactive harmful air pollutant that can damage living tissues and man-made materials upon contact.

The Clean Air Act of 1970 (CAA) required the United States Environmental Protection Agency (EPA) to develop health-based National Ambient Air Quality Standards (NAAQS) for several categories of air pollutants, including O_3. The Federal Clean Air Act Amendments (FCAAA) of 1990 gave states the primary responsibility for achieving the NAAQS by developing and adopting a State Implementation Plan (SIP). Limits were established for the 8-hour O_3 NAAQS in 1997, 2008, and 2015. Each revision made the O_3 NAAQS more stringent.

In 2018, EPA classified most of the District as Moderate nonattainment pursuant to the 2015 8-hour O_3 NAAQS. The Indian Wells Valley is in attainment. These designations are based on air monitoring data collected over many years within the District.

EPA requires air districts classified as Moderate nonattainment or higher to submit a SIP revision that demonstrates air pollution rules meet Reasonably Available Control Technology (RACT) requirements. RACT is defined as the lowest emissions limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility. This includes major sources subject to control technique guidelines (CTGs) issued by the EPA, and major sources of the O_3 precursor emissions volatile organic compounds (VOCs) and oxides of nitrogen (NOx). The District has prepared and adopted a RACT SIP to satisfy the requirements of the 2015, 8-hour O_3 NAAQS.

By: Jeremiah Cravens

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Mick Gleason (KC 1st District Supervisor)
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Board of Directors usually meet once every two months starting in January at the Tehachapi Police Department Community Room.

Air Pollution Control Officer

Glen E. Stephens, P.E.

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For news updates and other information, please visit the Eastern Kern APCD website at www.kernair.org

EASTERN KERN APCD
2700 M STREET, SUITE 302
BAKERSFIELD, CALIFORNIA 93301