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To: Kathy Wille and Russ Robers
C2R Global Manufacturing Inc. | Narc Gone™

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From: Henry Nowicki, Ph.D.

Report: February 19, 2015

Sample ID: EE-541

Subject: GAED test summary of activated carbon used in Narc Gone™

The activated carbon, EE-541, used in Narc Gone was fully characterized with Gravimetric Adsorption Energy Distribution or GAED advanced test method and compared with four commercial benchmark reference activated carbons. The full report is attached. At PACS, our scientific team is lead by Dr. Henry Nowicki, Ph.D. and Wayne Schuliger, P.E. and we provide routine and advanced testing, R&D, and consulting services for the activated carbon industry over the past 30 years. The GAED method, for which PACS is the only commercially available source, can also be used to determine the location (coarse or fine pores) of impregnates on the carbon, to follow the process of activation or reactivation, to select the best carbon for a particular application, provide isotherms for any organic compound at any desired temperature, to benchmark new activated carbons, against existing commercial products, or to evaluate other adsorbents. GAED is used by Calgon Carbon, the prior employer of Dr. Nowicki. Additionally, GAED has many other uses; perhaps it is the best available test method for activated carbons full characterizations for vapor- and aqueous-phase applications.

- The GAED results supports that activated carbon, EE-541 preforms at high pore volume levels. Pore volume provides the carbon loading capacity limit of available space. ALL CARBONS ARE NOT THE SAME. Activated carbon suppliers typically segment their product offerings into aqueous- and gas-phase carbon applications. Before GAED analysis was provided the received and dry apparent densities were determined to enable the GAED to be presented based on a dry volume basis and determine water concentration. The carbon sample contained 16.4% moisture determined by the oven method. Received apparent density is 0.572- and dry apparent density was 0.478 g ee. The calculated BET surface area indicated that this GAC had a surface area of 643 sq. meters/g, which is about % of the PCB Reference material (Data Summary Table Appendix A). The Differential Characteristic Curves in Figure 1b showed that the nano-structure of this material resembled the CAL Coal-based Liquid phase reference.

Water conveys molecules dissolved in the liquid phase to the interior of activated carbon particles to active adsorption sites. A teaspoon of activated carbon has the surface area of a football field. It is not easy to infuse water into the nano-porous

structure of activated carbon; this is absolutely required for carbon to work. If the compressed air in the pores are not wetted and removed initially, they will not be available to adsorb for the life of carbon use. After conversations with C2R Global Manufacturing, they are able to optimize carbon pore volume wetting through a process of temperature and replacing the concentrated air (about seven times ambient atmospheric pressure level) in carbon's pores with hot water of about 120°F to achieve maximum pore adsorption space wetting. C2R Global uses proper carbon wetting, requiring 72 hours of soaking and stirring the supernatant, and replacing fresh hot water.

Perhaps the most often heard complaint from carbon users that carbon is NOT working, is due to improper wetting. Narc Gone solves this problem.

Most all of the drugs are high enough molar volume (molecular weight + density) and low enough water solubility that they are readily adsorbed even at parts per trillion concentrations. The GAED test results indicate that the carbon in Narc Gone maximizes the surface area for the adsorption of various organic chemicals. The Michael Polanyi Equation for physical potential adsorption energy is the basis of GAED full characterization:

$$E = RT \log \left(\frac{C_s}{C} \right)$$

E = Adsorption Potential Energy

R = Gas Constant

T = Temperature in Kelvin

- C_s = Saturation concentration in water for compound of interest
- C = Actual concentration in water for compound of interest.

This equation coupled with our GAED map of the physical adsorption space (range of adsorption energies lowest to highest and corresponding pore volume for each AE) for this specific carbon material allows the determination of the isotherm for any organic compound, at any temperature of interest. Extra compounds isotherms cost \$450 each. One can now rapidly determine what amounts to a calibrating isotherm ("correlation curve") on a carbon, and then compute, for that carbon, the adsorption isotherms of a wide variety of gases/vapors or solutes from water solution, from traces to saturation, using software available from PACS. No other physical adsorption model is as useful as the Polanyi Potential Energy Physical Adsorption Model.

The Narc Gone™ is designed to provide enough pore volume to provide complete adsorption and thus non-retrievable drugs destruction for practical purposes.

After reviewing studies by Dr. David Cooney, Dr. Fowler, Dr. Signid Peldszusl and Dr. Bert McCarty involving studies that result in the physical adsorption of active medication ingredients by activated carbon, there is no need to reproduce these results and the data in these studies can be applied to the activated carbon, EE-541. Due to the enormous numbers of present medications in the marketplace and new drug developments, it would not be practical to test the adsorption capacity and rate of adsorption for each specific drug.

The Narc Gone drug disposal technology works on a Batch Process. Liquid is in contact with activated carbon which deactivates the compounds by physically adsorbing them, which makes the substances not available for drug diversion or abuse. Typically there will be a small trace amount of drug ingredients remaining in the liquid phase at completion. The vast majority of drug will be "non-retrievable", because it is tightly bound in the micropores. It takes commercial reactivation, furnace at 1700°F to restore the carbon activity. At this red heat adsorbate drugs are mineralized to carbon dioxide and water. Their boiling points are too high for desorption without breaking bonds, so the drugs will never leave the pores as the whole molecule and thus once adsorbed and the carbon bed is drained, there is no mechanism for the drugs to leave the pores as the original molecule. Small amounts of used carbons are not practical for furnace reactivation. Small amounts of spent or used carbon can go to regular waste disposal, because the adsorbate are strongly bound and not retrievable by any commonly available method. Since each Narc Gone™ device has an unknown complex combination of dissolved substances, it is impossible to restore a drug from the liquid phase. The Narc Gone™ has been engineered to inhibit any reverse engineering attempts to reverse engineer the device. There is no known process to reverse the liquid phase or solid carbon phase to bring back a medication to its original medically intended form or other form that can be abused.

Regards,

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