

ABSORPTION/ADSORPTION EFFICACY TEST PROTOCOLS AND ANALYTICAL PROCEDURES

for determining quantitative contaminant-specific
gas/vapor/odor reduction capabilities of "Stall Genie®"

I. PURPOSE & SCOPE

This testing and analysis protocol is presented to define the material-specific procedures for assessing the absorption/adsorption efficacy of "StallGenie®", a solid clinoptilolite mineral ore fine (powder), manufactured by Sports Prescriptions, Inc of Cameron Park, CA. (please see the Material Safety Data Sheet in the Appendix).

While actual field efficacy reviews have proven most favorable no laboratory data exists confirming the vapor/gas/odor reduction capabilities of the product, and therefore the best application parameters suitable for the product. Objectives of this sampling and analytical protocol include defining in quantitative measurements the airborne concentration reduction ability of StallGenie® relative to known concentrations in air of given gases and/or vapors, assimilating potential occupational exposure reduction, airborne effluent removal, and general objectionable odor reduction and control.

Sampling and analytical procedures presented herewith are standardized industrial hygiene collection and sample analysis protocols, reflecting current NIOSH (National Institute for Occupational Safety & Health) accepted analytical methods.

By intent, no exotic sample exposure devices, equipment, or procedures are required, and all sample analytical techniques are typical laboratory methodologies and instrumentation. Care must be exercised, however, in StallGenie® pre-exposure conditioning, as conditions of temperature and humidity will impact the efficacy and final results of exposure, sample collection, and analysis. It is unlikely that limits of quantitation or detection will be exceeded, given the subject gaseous/vapor exposure concentrations, and lack of any actual airborne concentrations of contaminants being drawn through the StallGenie® product through traditional industrial hygiene sampling methodologies.

Equilibrium (saturation) adsorptive capacity and kinetic

II. QUALITY ASSURANCE

It is essential that established quality assurance and control procedures are consistently applied to effect maximum reliance and repeatability of the experiments. In particular, control of the conditioning of unused StallGenie® samples prior to exposure and subsequent desorption and analysis must be undertaken. Calibration of sampling devices and monitoring/analytical instrumentation is a critical component of verifiable data collection. Detailed records/reports of equipment/device calibration, sample weights, temperature, pressure and humidity conditions, and management/handling methods must be maintained to assure confidence in procedure recreation.

III. EXPOSURE, SAMPLING, AND ANALYSIS STRATEGY

The test protocols establish an easily duplicated procedure of StallGenie® product exposure, sampling for determining the actual exposure concentration, and subsequent desorption and analysis of the exposed product to define concentrations and/or percentages of exposure concentration collection/entrapment.

While real-time monitoring and recording instrumentation is preferred during StallGenie® sample exposure, using readily available continuous monitoring instruments (i.e. Foxboro Organic Vapor Monitors; MSA Continuous Infrared Detectors; or HNU OVM), traditional quantitative industrial hygiene sampling methodologies, equipment, and analysis techniques would also be acceptable at perhaps reduced costs. Examples of IH sampling devices include MSA Personal Monitoring Pumps and collection devices (activated charcoal sampling tubes); Gillian Instrument brand personal/area sampling pumps, etc.; or other competitive devices. While collected samples obtained using personal/area sampling pumps and sample collection sorbent tubes will require analysis following the collection effort, it may become economically feasible and desirable to enlist the use of direct-reading monitoring devices, eliminating the need for analysis of the sample collection tubes/sorbents.

Controlled and measurable exposure concentrations will be assured through the use of a dedicated, gas-tight enclosure into which StallGenie® sample and known concentrations of test contaminants are introduced and measured. Volumetric calculations, based on test enclosure area and known concentrations of contaminants introduced, will be performed to document the actual airborne concentration of exposure, verified and recorded by direct-reading monitors (if used). Enclosure can be similar to the Fisher Scientific Glove Box Models 11-389; 11-391-100; 11-389-6; or 16-101-1.

Methods of exposure of the subject StallGenie® product include simple liquid evaporation in contained enclosure, with vapor concentration (in air) calculated based on time, temperature, or other ambient/atmospheric conditions, concentration verified by continuous monitoring devices, when and where used. Gaseous exposure media will be introduced through sampling ports on the enclosure, from lecture bottle supply of desired contaminant. Time of exposure, airborne concentration, and

other environmental factors including temperature, humidity, and atmospheric pressure will be recorded during each test.

It will be necessary to evacuate, purge, and evacuate the test chamber between sample and exposure contaminant cycles preventing cross-contamination and/or interferences that may develop. All tests will be performed as contaminant concentrations in air, however the ambient air conditions should be closely monitored within the laboratory to avoid these same cross-contamination interferences. Bottled "Grade D" air may be required to assure prevention of contamination from other lab environment materials.

Exposed StallGenie® sample will be weighed, desorbed, and analyzed, assessing quantitatively the actual entrapped/adsorbed/absorbed quantity of subject exposure media, compared with the actual airborne concentration detected within the test chamber. As a time-weighted analysis, the total adsorption/absorption capability of the StallGenie® product will be assessed.

Depending on the subject contaminant, analytical techniques and equipment/instrumentation needs will be: gas chromatography - flame ionization detection; ion chromatography; visual absorption spectrophotometry; or, gas chromatography - flame photometric detection.

As temperature and humidity variables will impact resultant adsorption/absorption efficiency, these conditions must also be recorded during the test procedure. Typical of most solid sorbents, increased temperature and humidity conditions will negatively impact sorptive effectiveness. Although it will not be necessary to adjust existing ambient temperature and humidity, the actual relative test conditions must be recorded.

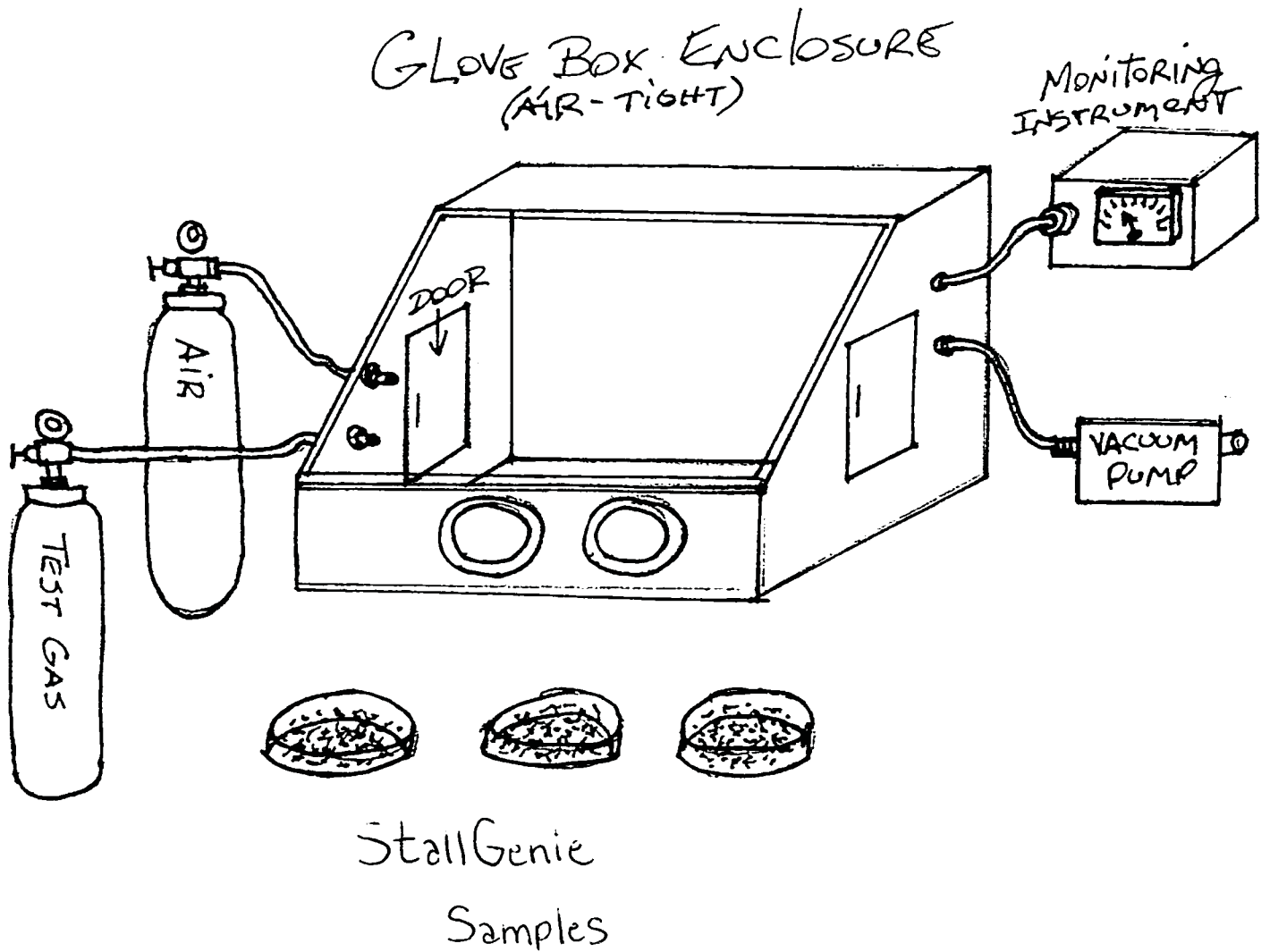
IV. CONTAMINANTS TO BE ASSESSED

The following material-specific test and analysis protocols reflect desired interest in StallGenie® efficacy determination absorbing/adsorbing/entrapping:

Hydrogen Sulfide	Sulfur Dioxide
Ammonia	Hydrocarbons -
Hydrocarbons -	BP 36 to 126 C:
Halogenated:	benzene
tetrachloroethylene	toluene
methylchloroform	cyclohexane
carbon tetrachloride	cyclohexene
chloroform	methylcyclohexane
benzyl chloride	n-heptane
bromochloromethane	n-hexane
ethylene dichloride	n-octane
chlorobenzene	n-pentane
o-dichlorobenzene	Amines -
p-dichlorobenzene	diethylamine
	dimethylamine

V. TEST EQUIPMENT/APPARATUS

Example of test apparatus and enclosure:



VI.2 Sulfur Dioxide

VI.3 Ammonia

VI.4 Hydrocarbons - BP 36 to 126°C

benzene
toluene
cyclohexane
cyclohexene
methylcyclohexane
n-heptane
n-hexane
n-octane
n-pentane

VI.5 Hydrocarbons - Halogenated :

tetrachloroethylene (perchloroethylene)
methylchloroform (1,1,1-trichloroethane)
carbon tetrachloride (tetrachloromethane)
chloroform (trichloromethane)
benzyl chloride
bromochloromethane (Halon 1011)
ethylene dichloride
chlorobenzene
p-dichlorobenzene
o-dichlorobenzene

VI.6 Amines - Aliphatic :

diethylamine
dimethylamine

PROPERTIES:

gas; BP -60°C; VP 20 atm @ 25°C; vapor density (air=1) 1.19

SYNONYMS:

sulfuretted hydrogen; hydrosulfuric acid; hepatic gas;
CAS #7783-06-4

PRECAUTIONS: Asphyxiant; Extremely toxic upon inhalation;
pungent (rotten egg) odor in small concentrations; highly flammable.

MEASUREMENT TECHNIQUE:

gas chromatography (GC), thermal desorption, FPD in sulfur mode

MEASUREMENT CALIBRATION:

standard mixtures of H₂S in air or N₂ prepared from pure H₂S (95.5%
minimum purity) in the range of 14 to 280 ug per sample.

LIMIT OF DETECTION (LOD):

14 ug per sample

1 GENERAL PROCEDURE:

- 1.1 Test chamber is evacuated, purged (N₂), evacuated, and filled with Grade "D" air in preparation for introduction of subject contaminant and test samples. Relative humidity, ambient temperature, and atmospheric pressure are recorded.
- 1.2 A known volume/concentration of Hydrogen Sulfide in air in the range of 15 - 60 mg/m³ is introduced into the test chamber, assessed with direct-reading instruments and recorded.
- 1.3 Petri dishes (or similar) of 500g quantities of "StallGenie®" product are exposed to the test chamber Hydrogen Sulfide/Air concentration for 15-minutes, 30-minutes, and 1-hour respectively, at ambient temperature, pressure, and humidity (also recorded).
- 1.4 Exposed "StallGenie®" samples are sealed at respective exposure intervals, subsequently removed from the test chamber for desorption and analysis (within 7 days).
- 1.5 "StallGenie®" sample absorption/adsorption total concentrations are recorded for each exposure/test sample.
- 1.6 Test chamber enclosure is evacuated, purged (N₂), evacuated, and filled with Grade "D" air for next experiment/contaminant.

2. EXPOSED SAMPLE ANALYSIS:

- 2.1 Exposed "StallGenie®" sample is transferred to a 2-mL stoppered sample vial.
- 2.2 Sample is positioned in the thermal desorption unit. For small (anticipated) concentrations, the sample can desorb directly into the gas chromatograph for separation and analysis.
- 2.3 For samples of greater concentration(anticipated), the sample must go through a sample splitter or be desorbed into an evacuated vessel of known volume.
- 2.4 The temperature for thermal desorption of Hydrogen Sulfide is 180°C.
- 2.5 The typical operating conditions for the gas chromatograph are 50 mL/min (50 psig) nitrogen carrier gas flow; 170 mL/min (30 psig) hydrogen gas flow to detector; 200 mL/min (60 psig) air flow to detector; 100°C injector temperature; 50°C column temp. Retention time of 2-3 minutes can be expected for Hydrogen Sulfide under these conditions using a 36' X 1/8" FEP Teflon column, packed with 40/60 mesh Chromosorb T coated with 12% polyphenyl ether and 0.5% H3P04.
- 2.6 Standards are prepared and analyzed under the same GC conditions and same period as the subject test samples corresponding to conditions of actual exposed test sample analysis.
- 2.7 Thermally desorbed sample is injected into the gas chromatograph directly from the thermal desorption unit with a heated 3 mL gas sampling loop; or via a 3 mL gas-lock syringe if the sample was desorbed into the evacuated vessel mentioned in 2.3.

3. CONCENTRATION CALCULATIONS:

- 3.1 The resultant total entrapped concentration of Hydrogen Sulfide can be expressed as percentage by volume of the previously recorded test chamber concentration in air.

$$C = \frac{m \times 103}{V}$$

where: m = actual mass of substance, in mg, found in sample
 V = air volume (in test chamber) at ambient temp/pres.
 C = air concentration of contaminant (mg/m³)

- 3.2 Compare test chamber atmosphere (concentration) with analytical results of desorbed test sample.

**"STALLGENIE" EXPOSURE, SAMPLING
& ANALYSIS PROTOCOL**

**TEST VI.2
SULFUR DIOXIDE**

SO₂

PROPERTIES:

gas; vapor density (air=1) 2.26; BP -10°C; MP -75.5°C

CAS #7446-09-5

PRECAUTIONS: Irritant; pungent odor; nonflammable; water-soluble

MEASUREMENT TECHNIQUE:

ion chromatography

ANALYTE: sulfite and sulfate ions

DESORPTION: 10 mL 3mM NaHCO₃/2.4 mM Na₂CO₃

INJECTION LOOP VOLUME: 100 uL

ELUENT: 3 mM NaHCO₃/2.4 mM Na₂CO₃, 2 to 3 mL @ ambient temperature

COLUMNS: anion precolumn, fast run, anion separator, fast run;
anion suppressor

CONDUCTIVITY SETTING: 10 uS full scale

CALIBRATION: standard solutions of SO₃ and SO₂ in eluent

RANGE: .05 to .2 mg SO₂ per sample

ESTIMATED LIMITS OF DETECTION (LAD): .02 mg SO₂ per sample

1. GENERAL PROCEDURE:

- 1.1 Test chamber is evacuated, purged (NO₂), evacuated, and filled with Grade "D" air in preparation for introduction of subject contaminant and test samples. Relative humidity, ambient temperature, and atmospheric pressure are recorded.
- 1.2 A known volume/concentration of Sulfur Dioxide in air is introduced into the test chamber, and assessed with direct-reading instruments and recorded.
- 1.3 Petri dishes (or similar) of 500g quantities of "StallGenie®" product are exposed to the test chamber Sulfur Dioxide/air concentration for 15-minutes, 30-minutes, and 1-hour respectively at ambient temperature, pressure, and humidity (also recorded).
- 1.4 Exposed "StallGenie®" samples are sealed at respective exposure intervals, subsequently removed from the test chamber for analysis (within 3 days).

- 1.5 "StallGenie®" sample absorption/adsorption total concentrations are recorded for each exposure/test sample.
- 1.6 Test chamber enclosure is evacuated, purged, evacuated, as in 1.1 above.

2. EXPOSED SAMPLE ANALYSIS:

- 2.1 Transfer the exposed "StallGenie®" product into clean vial (clean with deionized water).
- 2.2 Add 10 mL eluent (see above) to each vial, shake, and let stand.
- 2.3 Add 1 (one) drop 30% H₂O₂ (hydrogen peroxide) to oxidize sulfite to sulfate.

PRECAUTIONARY NOTE: H₂O₂ is a strong oxidizer and can be explosive. Avoid contact with skin. If contact occurs, flush immediately with copious amounts of water.

- 2.4 Pour each sample into a syringe (10 mL, polyethylene, with luer tip) fitted with an in-line filter (luer tip holder with membrane filter, 13- or 25-mm, 45-ug pore size).
- 2.5 Set ion chromatograph to conditions suggested above, and according to manufacturers recommendations.
- 2.6 Calibrate ion chromatograph per manufacturers' instructions, specific to sulfur dioxide (sulfites/sulfates) using stock calibration solutions.
- 2.7 Inject sample aliquot. For manual operation, inject 2mL of sample from syringe to ensure complete rinse of sample loop following calibration.
- 2.8 Measure peak concentrations of detectable SO₂ samples and record.

3. CALCULATIONS:

- 3.1 Calculate total sample concentrations from analysis and compare with airborne chamber concentrations, providing percentage by volume in air total.

PROPERTIES: gas (anhydrous) or liquid; BP -33.4°C; MP -77.7°C;
explosive range 15 to 25% v/v in air

CAS #7664-41-7

PRECAUTIONS: Strong irritant to eyes and respiratory tract

MEASUREMENT TECHNIQUE:

ion chromatography, conductivity detection

ANALYTE: NH₄ (ammonium ion)

INJECTION VOLUME: 100 uL

ELUENT: 0.05 M HCl; 2.6 mL/min

COLUMNS: 4-mm X 5-cm cation precolumn;
4-mm X 20-cm cation fiber suppressor

CALIBRATION: aqueous NH₄⁺ solutions

RANGE: 2 to 110 ug per sample

ESTIMATED LIMITS OF DETECTION (LOD): 1 ug NH₃ per sample

1. GENERAL PROCEDURE:

- 1.1 Test chamber is evacuated, purged, evacuated, and filled with Grade "D" air in preparation for introduction of subject contaminant and test samples. Relative humidity, ambient temperature, and atmospheric pressure are recorded.
- 1.2 A known volume/concentration of Ammonia in air is introduced into the test chamber, and assessed using direct-reading instruments and recorded.
- 1.3 Prepare solution of 0.01 N H₂SO₄. (Add 28 mL concentrated H₂SO₄ to 500 mL deionized water. Dilute to 1L with deionized water).

PRECAUTIONARY NOTE: Concentrated H₂SO₄ should be handled in hood.

- 1.4 Saturate "StallGenie" sorbent samples in 0.1 N H₂SO₄ solution (per 1.3. above).
- 1.5 Petri dishes (or similar) of 500g quantities of "StallGenie®" product are exposed to the test chamber Ammonia/Air concentration for 30-minutes, 1-hour, and 2-hours respectively, at ambient temperature, pressure, and humidity.

- 1.6 Exposed "StallGenie®" samples are sealed at respective exposure intervals, subsequently removed from test chamber for analysis.
- 1.7 "StallGenie®" sample absorption/adsorption total concentrations are recorded for each exposure test sample.
- 1.8 Test chamber enclosure is evacuated, purged, evacuated, in preparation for next test procedure, as in 1.1 above.

2. EXPOSED SAMPLE ANALYSIS:

- 2.1 Set ion chromatograph to conditions established above, and calibrate per manufacturers instructions.
- 2.2 Transfer liquid from exposed sorbent sample to autosampler vials and set instrument for 100 uL injections. For manual operation inject 2 to 3 mL of sample to ensure complete rinse of sample loop following calibration.
- 2.3 Measure and record sample concentration peak, where detectable concentrations exist.

3. CALCULATIONS:

- 3.1 Calculate sample analysis results versus airborne test chamber concentration in percentage by volume of air for each test sample.-

"STALLGENIE" EXPOSURE, SAMPLING
& ANALYSIS PROTOCOL

TEST VI.4
HYDROCARBONS-
BP 36 - 126°C

NOTE: Hydrocarbons considered - benzene, toluene, cyclohexane, -hene,
methylcyclohexane, n-heptane, n-hexane, n-octane, n-pentane

PROPERTIES: see table 1

MEASUREMENT TECHNIQUE:

gas chromatography, flame ionization detection

ANALYTES: hydrocarbons listed above

ELUENT: CS₂ chromatographic quality

SPECIAL PRECAUTION: CS₂ is toxic and extremely flammable. Prepare
eluent in well-ventilated exhaust hood.

DESORPTION: 1 mL CS₂; let stand 30-minutes

INJECTION VOLUME: 5 uL

TEMPERATURE - INJECTION: 250°C
DETECTOR: 250°C
COLUMN: see table 2.

CARRIER GAS: N₂ or He, 25 mL/min

COLUMN: glass, 3.0 m X 2 mm, 20% SP-2100 on 80/100 mesh Supelcoport

CALIBRATION: analytes in CS₂.

RANGE: see table 2.

**ESTIMATED LIMITS OF DETECTION (LOD): .001 to .01 mg per sample with
capillary column.**

1. GENERAL PROCEDURE:

- 1.1 Test chamber is evacuated, purged, evacuated, and filled with Grade "D" air, in preparation for introduction of subject contaminants and test samples. Relative humidity, ambient temperature, and atmospheric pressure are recorded.
- 1.2 A 50 mL quantity of subject contaminant (from above listing) is introduced into test chamber, and allowed to evaporate to a detectable concentration range in air (see table 2).
- 1.3 Direct-reading instruments or calculated vaporized concentration in ppm and percent by volume is recorded. Sealed petri dish (or similar) containers of 500g quantities of "StallGenie®" product.

are exposed to the chambers' contaminant concentration, for 15-minutes, 30-minutes, and 1-hour respectively, at ambient temperature, pressure, and humidity (also recorded).

- 1.4 Exposed "StallGenie®" samples are sealed at respective exposure intervals, subsequently removed for analysis.
 - 1.5 GC - FID analysis is performed for each exposed sample, and total absorbed/adsorbed concentrations are recorded.
 - 1.6 Comparisons of test chamber contaminant concentrations versus "StallGenie®" sample concentrations are calculated and recorded.
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2. SAMPLE EXPOSURE:

- 2.2 "StallGenie®" samples as above (1.3) are unsealed and exposed to test chamber contaminant of known concentrations, in intervals also defined in 1.3 above.
 - 2.3 Following three sample exposure scenario, chamber is exhausted, sealed sample containers removed, labeled, and delivered for analysis.
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3. EXPOSED SAMPLE ANALYSIS:

- 3.1 Transfer each sample to clean glass vials (1-mL, with PTFE lined caps) and add eluent (see above) to each vial, immediately attach crimp cap to each vial. Let stand for 30-minutes, with occasional agitation.
 - 3.2 Calibrate GC per manufacturers' instructions, for subject analyte.
 - 3.3 Set column temperature per Table 2, for contaminant of interest.
 - 3.4 Draw sample aliquot from each glass vial manually, injecting sample aliquot using solvent flush technique or with autosampler.
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4. CALCULATIONS:

- 4.1 Record peak concentration of analyzed sample, and calculate percentage by volume versus recorded concentration in air in the test chamber.
 - 4.2 Repeat for each analyte and sample.
-

TABLE 1

NAME	EMPIRICAL FORMULA	MOLECULAR WEIGHT	BOILING POINT (° C)	VAPOR PRESSURE (mm Hg)
benzene	C ₆ H ₆	78.11	80.1	95.2
cyclohexane	C ₆ H ₁₂	84.16	80.7	97.6
cyclohexene	C ₆ H ₁₀	82.15	83.0	88.8
n-heptane	C ₇ H ₁₆	100.21	98.4	45.8
n-hexane	C ₆ H ₁₄	86.18	68.7	151.3
methylcyclohexane	C ₇ H ₁₄	98.19	100.9	46.3
n-octane	C ₈ H ₁₈	114.23	125.7	14.0
n-pentane	C ₅ H ₁₂	72.15	36.1	512.5
toluene - (methylbenzene)	C ₇ H ₈	92.14	110.6	28.4

TABLE 2.

NAME	MEASUREMENT RANGE (mg)	CARRIER GAS FLOW	----- COLUMN -----			
			TEMP. (°C)	LENGTH (m)	DIAM. (mm)	PACK-ING
benzene	0.9-3.5	N ₂ 50 mL/Min	115	9	3.2	A
cyclohexane	1.3-5.3	N ₂ 50	210	1.2	6.4	B
cyclohexene	2.4-9.7	N ₂ 50	205	1.2	6.4	B
n-heptane	4.08-16.3	He 30	80	3.0	3.2	C
n-hexane	3.56-14.5	He 30	52	6.1	3.2	D
methyl- cyclohexane	3.98-16.1	He 30	55	6.1	3.2	D
n-octane	4.75-18.9	He 30	52	6.1	3.2	D
n-pentane	2.98-11.8	He 30	52	6.1	3.2	D
toluene	1.13-4.51	N ₂ 50	155	9	3.2	B

* A = 50/80 mesh Poropak P

B = 50/80 mesh Poropak Q

C = 10% OV-101 on 100/120 mesh Suprelcoport

D = 10% FFAP on 80/100 mesh Chromosorb W AW-DMCS

**"STALLGENIE" EXPOSURE, SAMPLING
& ANALYSIS PROTOCOL**

TEST VI.5
HYDROCARBONS-
HALOGENATED

see listing

COMPOUNDS: tetrachloroethylene (perchloroethylene)
methylchloroform (1, 1,1-trichloroethane)
carbon tetrachloride (tetrachloromethane)
chloroform (trichloromethane)
benzyl chloride
bromochloromethane (Halon 1011)
ethylene dichloride
chlorobenzene
p-dichlorobenzene
o-dichlorobenzene

PROPERTIES:

narcosis producing compounds; some are suspected or probable carcinogens; see Table 1.

MEASUREMENT TECHNIQUE:

gas chromatography, flame ionization detection.

ANALYTES: above compounds

DESORPTION: 1 mL CS₂, let stand 30-minutes

INJECTION VOLUME: 5 uL

TEMPERATURES: see table 2.

CARRIER GAS: N₂ or He, 30 mL/min.

COLUMNS: see table 2.

CALIBRATION: standard solutions of analyte in CS₂.

RANGE: see table 2.

ESTIMATED LIMITS OF DETECTION (LOD): .01 mg per sample

1. GENERAL PROCEDURES:

- 1.1 Test chamber is evacuated, purged, evacuated, and filled with Grade D air, in preparation for introduction of contaminant and "StallGenie®" test samples. Relative humidity, temperature, and atmospheric pressure are recorded.
- 1.2 A 50 mL quantity of the subject contaminant is introduced into the test chamber, and allowed to evaporate, while monitoring

detectable concentration in test enclosure air. (calculate the airborne concentration based on area of chamber, temperature, vapor pressure of contaminant, and time...or monitor with direct-reading instruments).

- 1.3 Sealed petri dish (or similar) of 500 g quantities of "StallGenie®" samples are exposed to the chambers contaminants, for 15-minutes, 30-minutes, and 1-hour, respectively, at ambient conditions.
- 1.4 Exposed "StallGenie®" samples are sealed at respective intervals, and labelled for subsequent analysis. Exposure concentrations in the test chamber air are also recorded with each sample.
- 1.5 Exposed samples are GC analyzed, defining concentration of contaminants absorbed/adsorbed versus airborne contaminant concentration in test chamber, as percentage by volume.

2. EXPOSED SAMPLE ANALYSIS:

- 2.1 To each sample dish, add 1 mL CS₂, let stand 30-minutes, with occasional agitation.

PRECAUTIONARY NOTE: CS₂ is extremely toxic and highly flammable. Work with CS only in a hood.

- 2.2 Calibrate GC per manufacturers instructions, with standard calibration solutions for subject contaminant analyses.
- 2.3 Set chromatograph to conditions established in table 2, per contaminant to be analyzed.
- 2.4 Inject sample aliquot manually, using solvent flush technique or autosampler.
- 2.5 Record peak concentration results for each test sample.

3. CALCULATIONS:

- 3.1 Determine sample analysis percent concentration in air compared with airborne exposure concentration in test chamber. Record results.

TABLE 1

COMPOUND NAME	MOLECULAR WEIGHT	SYNONYMS
benzyl chloride	126.58	(chloromethyl) benzene
chloroform	119.39	trichloromethane
tetrachloroethylene	165.83	perchloroethylene

methyl chloroform	133.42	1,1,1-trichloroethane
carbon tetrachloride	153.84	tetrachloromethane
bromochloromethane	129.39	chlorobromomethane; Halon 1011
ethylene dichloride	98.96	1,2-dichloroethane
chlorobenzene	112.56	monochlorobenzene; phenyl chloride
p-dichlorobenzene	147.00	1,4-dichlorobenzene
o-dichlorobenzene	147.00	1,3-dichlorobenzene

TABLE 2.

NAME	RANGE (mg/sample)	-----C O L U M N -----	
		TYPE *	COL/INJ/DET (°C)
benzyl chloride	.02 to 15	A	160/170/210
bromoform	.02 to 15	A	130/170/210
carbon tetrachloride	.2 to 7	B	60/155/200
chlorobenzene	.4 to 10	A	105/190/250
chlorobromomethane	.5 to 15	A	80/170/210
chloroform	.4 to 11	B	75/155/200
o-dichlorobenzene	.1 to 3	C	140/225/250
p-dichlorobenzene	.2 to 4	A	140/225/275
ethylene dichloride	.1 to 4	C	70/225/250
methylchloroform	.6 to 17	C	70/225/250
tetrachloroethylene	.4 to 12	C	90/225/250

* A = 3 m X 3 m m O D stainless steel,
10% SP-1000 on 80/100 mesh Chromosorb WHP.

B = 6 m X 3 m m O D stainless steel,
10% SP-1000 on 80/100 mesh Chromosorb WHP.

C = 3 m X 3 m m O D stainless steel,
10% OV-101 on 100/120 mesh Chromosorb WHP.

**"STALLGENIE" EXPOSURE, SAMPLING
& ANALYSIS PROTOCOL**

TEST VI.6
AMINES-
ALIPHATIC

NOTE: Amines considered: Diethylamine; dimethylamine

PROPERTIES: Highly flammable; strong ammoniacal odors; severe eye damage can occur; readily absorbed through the skin.

MEASUREMENT TECHNIQUE:

gas chromatography, flame ionization detection

ANALYTE: amines

DESORPTION: 1 mL dilute H₂SO₄ in 10% (v/v) aqueous methanol,
3 h ultrasonic

INJECTION VOLUME: 1 uL

CARRIER GAS: nitrogen, 30 mL/min.

COLUMN: 18 m X 4 mm ID glass, 4% Carbowax 20M + 8% KOH on
Carbosieve B (60/80 mesh)

CALIBRATION: standard calibration solutions of analyte in dilute
sulfuric acid

RANGE: diethylamine = .5 to .11 mg per sample
dimethylamine = 15 to 2.6 mg per sample

ESTIMATED LIMIT OF DETECTION (LOD): .02 mg per sample

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1. GENERAL PROCEDURE:

- 1.1 Test chamber is evacuated, purged, evacuated in preparation for contaminant introduction. Chamber filled with Grade D air, and sealed sample containers placed within chamber.
- 1.2 Ambient conditions monitored and recorded... temperature, humidity, and atmospheric pressure.
- 1.3 Contaminant in 50 mL quantity is introduced into test chamber and allowed to evaporate. Direct-reading instruments or calculations based on chamber area, temperature, contaminant vapor pressure, determine actual airborne concentrations. Concentrations recorded.
- 1.4 "StallGenie®" samples (500 g) exposed to air contaminants, for 15-minutes, 30-minutes, and 1-hour respectively, at ambient temperature, pressure, and humidity (also recorded).
- 1.5 Samples resealed and labeled, for eventual removal and analysis.

- 1.6 GC - FID analysis performed for each exposed test sample.
- 1.7 Analysis results recorded, and compared with test chamber concentrations, for calculation of adsorbed/absorbed percentage by volume.

2. EXPOSED SAMPLE ANALYSIS:

- 2.1 Transfer exposed "StallGenie®" samples to separate clean vials, adding 1 mL .1M H₂SO₄ in aqueous methanol (90% H₂O+ 10% methanol). Tightly cap vials.
- 2.2 Agitate sealed vials in ultrasonic water bath for 3 h.
- 2.3 Calibrate GC following manufacturers' instructions, and standard calibration solutions.
- 2.4 Set chromatograph conditions as follows:

NAME	INJECTOR TEMP.	COLUMN TEMP.	DETECTOR TEMP.
diethylamine	160°C	70°C	200°C
dimethylamine	155°C	60°C	200°C

- 2.5 Neutralize sample by transferring a 500 uL aliquot of the supernatant liquid to a clean vial (avoid transferring particles). Add 500 uL .3 M KOH, check pH of solution (should be greater than 10). Immediately analyze solutions
- 2.6 Record peak concentrations detected in samples.

3. CALCULATIONS:

- 3.1 Determine percentage by volume of resultant sample concentrations versus airborne concentrations in test chamber. Record results.

Our Ref: STALLDATA 1

MATERIAL SAFETY DATA SHEET

STALLGENIE

SECTION I -- PRODUCT IDENTIFICATION

Trade Name: STALLGENIE®

Generic Name: CLINOPTILOLITE MINERAL ORE FINES

Chemical Name: SODIUM, CALCIUM ALUMINOSILICATE, HYDRATED

Formula: ESSENTIALLY Ca₂(Na,K)₂A₁₈Si₂₈O₇₂.24H₂O

Manufacturer: SPORTS PRESCRIPTIONS, INC.
4175 BUSINESS DRIVE, STE. D
CAMERON PARK, CA 95682
(530) 677-0724

SECTION II -- PRODUCT INGREDIENTS

<u>INGREDIENT NAME</u>	<u>PER CENT</u>	<u>PEL</u>
Mineral Components: Clinoptilolite, montmorillonite and crystalline silica	99.8	.025mg/m ³ (PEL based on up to 20% crystalline silica)
Natural Fiber	.01	
Plant Organisms & Microbes	.01	

SECTION III -- PHYSICAL DATA

Appearance and Odor: WHITE POWDER, NO ODOR

Boiling Point: N/A

Evaporation Rate: N/A

Vapor Pressure: N/A

Specific Gravity: 2.2 - 2.4

Vapor Density: N/A

Melting Point: N/A

Water Solubility: INSOLUBLE

Water Reactive: N/A

SECTION IV -- FIRE AND EXPLOSION DATA

Flash Point: NONFLAMMABLE

Flammable Limits: N/A

Extinguisher Media: N/A

Auto-Ignition Temperature: N/A

Special Fire Fighting Procedures: NONE

Unusual Fire or Explosion Hazards: NONE KNOWN

SECTION V -- REACTIVITY HAZARD DATA

Stability: STABLE PRODUCT

Conditions to Avoid: NONE KNOWN

Incompatibility (materials to avoid): NONE KNOWN

Hazardous Decomposition Products: NONE KNOWN

Hazardous Polymerization: WILL NOT OCCUR

SECTION VI -- HEALTH HAZARD DATA

SUMMARY: This product contains crystalline silica. Long term inhalation of crystalline silica dusts may cause lung disease (silicosis). IARC, a unit of the World Health Organization, has stated that "there is limited evidence for the carcinogenicity of crystalline silica to humans." This product has not been classified as a carcinogen by NTP and/or OSHA.

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED: Pre-existing upper respiratory irritation and lung disease.

TARGET ORGANS: Lungs

PRIMARY ENTRY ROUTE: Inhalation

ACUTE HEALTH EFFECTS: Transitory upper respiratory irritant

CHRONIC HEALTH EFFECTS: Long term inhalation of dust levels in excess of the PEL may cause lung disease (silicosis).

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Inhalation: COUGHING AND/OR IRRITATION OF NOSE AND THROAT

Ingestion: NOT HAZARDOUS

Skin Contact: N/A

Skin Absorption: N/A

Eyes: TEMPORARY IRRITATION AND/OR INFLAMMATION

EMERGENCY FIRST AID PROCEDURES

Inhalation: REMOVE FROM DUSTY AREA, DRINK WATER TO CLEAR THROAT AND BLOW NOSE

Ingestion: N/A

Skin Contact: N/A

Skin Absorption: N/A

Eyes: FLUSH WITH WATER

SECTION VII -- CONTROL AND PROTECTIVE MEASURES

Respiratory Protection: USE NIOSH APPROVED RESPIRATORS FOR PROTECTION FROM SILICOSIS PRODUCING DUSTS

Protective Gloves: NOT REQUIRED

Eye Protection: AVOID EYE CONTACT, SAFETY GLASSES MAY BE NECESSARY

Ventilation: USE ADEQUATE VENTILATION AND/OR DUST COLLECTION TO KEEP DUST LEVELS BELOW PEL

Other Protective Clothing and Equipment: NOT REQUIRED

SECTION VIII -- PRECAUTIONS FOR SAFE HANDLING

Steps to Take if Material is Spilled or Released: SWEEP UP. AVOID MAKING DUST, PLACE IN SUITABLE WASTE CONTAINER

Waste Disposal Methods: DISPOSE OF MATERIAL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

Precautions to be Taken in Handling and Storage: STORE IN A DRY PLACE, MAINTAIN GOOD HOUSEKEEPING PRACTICES

Other Precautions and/or Special Hazards: NONE KNOWN

PREPARED: 8/2009

StallGenie®

Neutralizes Noxious Gases &
Liquids on Contact

NATURAL • NON-TOXIC • ODORLESS • NON-FLAMMABLE
NON-CAUSTIC • INDEFINITE SHELF LIFE

*Absorbs, Encapsulates and Neutralizes
Toxic Liquids and Gases on Contact*

An all natural non-toxic material that removes harmful pollutants from the atmosphere/environment and encapsulates them for safe disposal.