

Texas Southern University

Digital Scholarship @ Texas Southern University

Theses (Pre-2016)

Theses

5-2008

Respiratory Risk Associated with Indoor Air Pollutants in the Form of Settled House Dust.

Herbert Jackson

Follow this and additional works at: https://digitalscholarship.tsu.edu/pre-2016_theses

Recommended Citation

Jackson, Herbert, "Respiratory Risk Associated with Indoor Air Pollutants in the Form of Settled House Dust." (2008). *Theses (Pre-2016)*. 118.

https://digitalscholarship.tsu.edu/pre-2016_theses/118

This Thesis is brought to you for free and open access by the Theses at Digital Scholarship @ Texas Southern University. It has been accepted for inclusion in Theses (Pre-2016) by an authorized administrator of Digital Scholarship @ Texas Southern University. For more information, please contact haiying.li@tsu.edu.

RESPIRATORY RISK ASSOCIATED WITH INDOOR AIR
POLLUTANTS IN THE FORM OF SETTLED
HOUSE DUST

THESIS

HERBERT JACKSON III

2008

RESPIRATORY RISK ASSOCIATED WITH INDOOR AIR POLLUTANTS
IN THE FORM OF SETTLED HOUSE DUST

Presented in Partial Fulfillment of the Requirements for
The Master of Science Degree in Environmental Toxicology

Texas Southern University

M. Saleh, PhD, Advisor

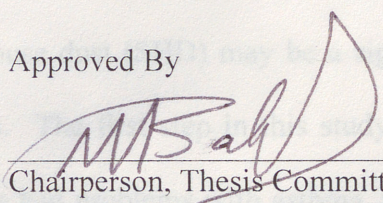
By

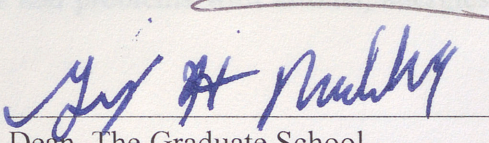
Herbert Jackson III, M.S.

Texas Southern University

2008

Approved By


Chairperson, Thesis Committee


Dean, The Graduate School

RESPIRATORY RISK ASSOCIATED WITH INDOOR AIR POLLUTANTS IN THE FORM OF SETTLED HOUSE DUST

By

Herbert Jackson III, M.S.

Texas Southern University, 2008

M. Saleh, PhD, Advisor

Asthma and allergies are considered by many doctors as being triggered by different substances in the air that we breathe. The lung is the most common site of injury by airborne pollutants. Acute effects, however, may also include non-respiratory signs and symptoms, which may depend upon toxicological characteristics of the substances and host-related factors.

The studying of indoor air quality can provide us with a method for appropriate remedial action. Research suggests that settled house dust (SHD) may be a significant source for indoor exposure to different substances. The first step in this study was to obtain dust samples from homes where the residents had problems with asthma, allergies or any other respiratory condition.

Dust samples were collected from residents with a history of asthma and allergies. There were also samples taken from residents with no history of asthma or allergies or other respiratory ailments. The Dust samples were collected from August 2006 thru March 2007 and analyzed using Gas Chromatography/Mass Spectroscopy.

Approved By

The purpose of this experiment is to show that the sampling of household dust is a very powerful tool in identifying chemicals that can contribute to poor indoor air quality.

Chairperson, Thesis Committee

Date

Committee Member

Date

Committee Member

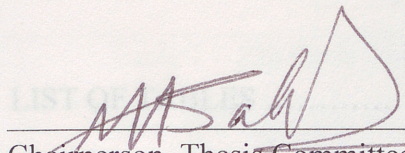
Date

Committee Member

Date

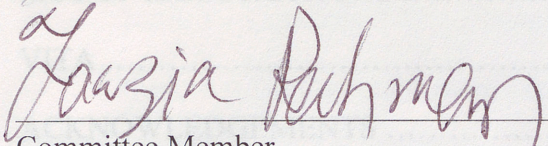
Approved By

TABLE OF CONTENTS



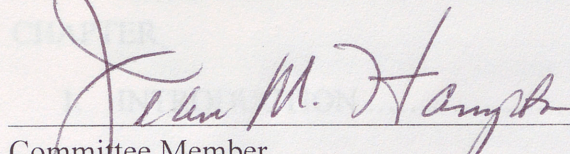
Chairperson, Thesis Committee

10/03/08
Date



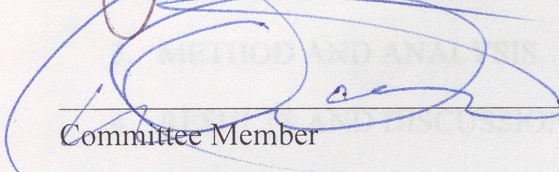
Committee Member

10/03/08
Date



Committee Member

10/06/08
Date



Committee Member

10/06/08
Date

5. CONCLUSION AND RECOMMENDATIONS

REFERENCES

TABLE OF CONTENTS

Title	Page
1. Table 1 – Zip Code 77459 (Sample #1)	8
LIST OF TABLES	iv
2. Table 2 – Zip Code 77085 (Sample #2)	12
LIST OF ILLUSTRATIONS	v
3. Table 3 – Zip Code 77057 (Sample #3)	15
VITA	vii
4. Table 4 – Zip Code Unknown (Sample #4)	18
ACKNOWLEDGEMENTS	viii
5. Table 5 – Zip Code 77071 (Sample #5)	21
CHAPTER	
6. Table 6 – Zip Code 77053 (Sample #6)	25
1. INTRODUCTION	1
7. Table 7 – Zip Code 77075 (Sample #7)	28
2. LITERARY REVIEW	3
8. Table 8 – Zip Code 77478 (Sample #8)	32
3. METHOD AND ANALYSIS.....	5
9. Table 9 – Zip Code 77053 (Sample #9)	36
4. RESULTS AND DISCUSSION.....	76
10. Table 10 – Zip Code Unknown (Sample #10)	40
5. CONCLUSION AND RECOMMENDATIONS	78
11. Table 11 – Zip Code 77031 (Sample #11)	44
REFERENCES	79
12. Table 12 – Zip Code 77071 (Sample #12)	47
13. Table 13 – Zip Code 77498 (Sample #13)	51
14. Table 14 – Zip Code 77072 (Sample #14)	54
15. Table 15 – Zip Code 77045 (Sample #15)	56
16. Table 16 – Zip Code Unknown (Sample #16)	59
17. Table 17 – Zip Code 77083 (Sample #17)	63
18. Table 18 – Zip Code 77099 (Sample #18)	66
19. Table 19 – Zip Code 77011 (Sample #19)	70
20. Table 20 – Zip Code 77382 (Sample #20)	73

LIST OF TABLES

	Title	Page
1.	Table 1 – Zip Code 77459 (Sample #1)	8
2.	Table 2 – Zip Code 77085 (Sample #2)	12
3.	Table 3 – Zip Code 77053 (Sample #3)	15
4.	Table 4 – Zip Code Unknown (Sample #4)	18
5.	Table 5 – Zip Code 77071 (Sample #5)	21
6.	Table 6 – Zip Code 77053 (Sample #6)	25
7.	Table 7 – Zip Code 77075 (Sample #7)	28
8.	Table 8 – Zip Code 77478 (Sample #8)	32
9.	Table 9 – Zip Code 77053 (Sample #9)	36
10.	Table 10 – Zip Code Unknown (Sample #10)	40
11.	Table 11 – Zip Code 77031 (Sample #11)	44
12.	Table 12 – Zip Code 77071 (Sample #12)	47
13.	Table 13 – Zip Code 77498 (Sample #13)	51
14.	Table 14 – Zip Code 77072 (Sample #14)	54
15.	Table 15 – Zip Code 77045 (Sample #15)	56
16.	Table 16 – Zip Code Unknown (Sample #16)	59
17.	Table 17 – Zip Code 77083 (Sample #17)	63
18.	Table 18 – Zip Code 77099 (Sample #18)	66
19.	Table 19 – Zip Code 77011 (Sample #19)	70
20.	Table 20 – Zip Code 77382 (Sample #20)	73

LIST OF ILLUSTRATIONS

	Title	Page
1.	Graph I – 1f (Sample #1)	10
2.	Graph II – 1v (Sample #1)	11
3.	Graph III – 2f (Sample #2)	13
4.	Graph IV – 2v (Sample #2)	14
5.	Graph V – 3f (Sample #3)	16
6.	Graph VI – 3v (Sample #3)	17
7.	Graph VII – 4f (Sample #4)	19
8.	Graph VIII – 4v (Sample #4)	20
9.	Graph IX – 5f (Sample #5)	23
10.	Graph X – 5v (Sample #5)	24
11.	Graph XI – 6v (Sample #6)	26
12.	Graph XII – 6f (Sample #6)	27
13.	Graph XIII – 7f (Sample #7)	30
14.	Graph XIV – 7v (Sample #7)	31
15.	Graph XV – 8f (Sample #8)	34
16.	Graph XVI – 8v (Sample #8)	35
17.	Graph XVII – 9f (Sample #9)	38
18.	Graph XVIII – 9v (Sample #9)	39
19.	Graph XIX – 10f (Sample #10)	42
20.	Graph XX – 10v (Sample #10)	43
21.	Graph XXI – 11v (Sample #11)	45

	Title	Page
22.	Graph XXII – 11f (Sample #11)	46
23.	Graph XXIII – 12v (Sample #12)	49
24.	Graph XXIV – 12f (Sample #12)	50
25.	Graph XXV – 13f (Sample #13)	52
26.	Graph XXVI – 14v (Sample #14)	54
27.	Graph XXVII – 14f (Sample #14)	55
28.	Graph XXVIII – 15v (Sample #15)	57
29.	Graph XXIX – 15f (Sample #15)	58
30.	Graph XXX – 16v (Sample #16)	61
31.	Graph XXXI – 16f (Sample #16)	62
32.	Graph XXXII – 17v (Sample #17)	64
33.	Graph XXXIII – 17f (Sample #17)	65
34.	Graph XXXIV – 18v (Sample #18)	68
35.	Graph XXXV – 18f (Sample #18)	69
36.	Graph XXXVI – 19v (Sample #19)	71
37.	Graph XXXVII – 19f (Sample #19)	72
38.	Graph XXXVIII – 20v (Sample #20)	74
39.	Graph XXXIX – 20f (Sample #20)	75

ACKNOWLEDGMENTS

VITA

May 23, 1974	Born- Houston, Texas
1997	Associate Degree in Respiratory Therapy Houston Community College
1998-2007	Staff Respiratory Therapist The Methodist Hospital
2001.....	B.S., Texas Southern University
2007-Present	Houston Community College Faculty Instructor, Respiratory Therapist Program Coleman College for Health Sciences
Major.....	Environmental Toxicology

ACKNOWLEDGEMENTS

I would like to thank all of my family, friends and colleagues who participated in this project. I would also like to extend my gratitude to the professors on my thesis committee. Without your cooperation, I would not have been able to conduct this study in the manner it was given. Special thanks to Dr. M. Saleh for mentoring and advising me in my research.

CHAPTER 1

INTRODUCTION

The main objective of this study was to use a simple method of dust collection by utilizing the dust from everyday house hold items; such as the dust from an air condition filters and vacuum bags would yield any chemicals after being processed and analyzed with the GC/MS.

Pollutants in the indoor environment can include chemical contaminants (e.g. pesticides, metals, plasticizers) biological contaminants (e.g. bacteria, molds, viruses, dust mites). Many of these Contaminants adsorb to particulate matter suspended in indoor air that later settles out as house dust. Inhalation of dust can occur when dust is suspended or re-suspended by activities such as vacuuming, cleaning, playing or simply walking through a room (Martens, M. M., Bailey, J., & White, P.A. 2004).

Exposure to chemical substances can cause adverse effects on the respiratory system; which consists of the nasal passages, pharynx, trachea, bronchi, and lungs. Respiratory toxicity can include a variety of acute and chronic pulmonary conditions, including local irritation, bronchitis, pulmonary edema, emphysema, and cancer. It is well known that exposure to environmental and industrial chemicals can impair respiratory function.

It is estimated that young children inhale between 0.15 and 0.34 mg of dust per day, while adults inhale approximately 0.81 mg per day (Martens., et al. 2004). Inhaled dust particles greater than 10 microns are generally trapped by the nose, throat or upper respiratory tract. The upper respiratory tract consists of the nasal and oral cavities the pharynx, and larynx. These structures serve as frontline defense mechanisms for the

lungs. Particles less than 2.5 microns have the ability to penetrate deep into the respiratory system where they are less likely to be eliminated (Martens, et al., 2004).

Since house dust was recognized as a common respiratory allergen in the early 20th century, research has focused on identifying the specific causes of its allergenicity. Early hypotheses made distinctions between settled house dust and "street dust," proposing that decayed cotton "linters" and "kapok fibers" from household furnishings and carpets were the allergenic agents in house dust (Zeldin., et al. 2007). Settled dust has been used in studies to assess exposures to allergens and other biologically active components.

Levels of compounds in house dust are a measure of indoor contamination but may also provide valuable information for assessment of human indoor exposure (Salle & Hansen, 2002).

Over the last few decades, asthma and allergies have increased all over the world. The causes of the increase in asthma and allergies are still unknown. Genetic changes are not believed to be important because the time interval (30-50 years) for the increase in allergies is far too short. Instead, environmental changes are suspected as possible causes (Mastek, K., Naydenov, K., Larsson, M., Bronchag, G. C., & Sundell, J. 2007).

Pollutants in the indoor environment can include radiation (e.g., radon gas), biological contaminants (e.g., bacteria, molds, viruses, dust mites), chemical contaminants (e.g., pesticides, metals, flame retardants, plasticizers), combustion products (e.g., environmental tobacco smoke, carbon monoxide, nitrogen dioxide) and others (Wallace, 2001). Many of these contaminants adsorb to particulate matter suspended in indoor air that later settles out as house dust. Research investigating human

CHAPTER 2

REVIEW OF LITERATURE

This review summarizes occurrence of settled house dust as being a marker for indoor exposure to chemical contaminants that can contribute to respiratory ailments. Several studies have identified house dust as an important route of toxicant exposure. Often levels of pollutants found in house dust, including compounds banned long ago, are significant sources of exposure for the general population, especially children. House dust is a sink and repository for semi volatile organic compounds and particle-bound matter. Analyses of compounds in house dust are a measure of indoor contamination but may also provide valuable information for assessment of human indoor exposure (Butte & Heinzow, 2002).

Over the last few decades, asthma and allergies have increased all over the world the causes of the increase in asthma and allergies are still unknown. Genetic changes are not believed to be important because the time interval (30–50 years) for the increase in allergies is far too short. Instead, environmental changes are suspected as possible causes (Kolarik, K., Naydenov, K., Larsson, M., Bronehag, G. C., & Sundell, J. 2007).

Pollutants in the indoor environment can include radiation (e.g., radon gas), biological contaminants (e.g., bacteria, molds, viruses, dust mites), chemical contaminants (e.g., pesticides, metals, flame retardants, plasticizers), combustion products (e.g., environmental tobacco smoke, carbon monoxide, nitrogen dioxide) and others (Wallace, 2001). Many of these contaminants adsorb to particulate matter suspended in indoor air that later settles out as house dust. Research investigation human

CHAPTER 3

exposures to priority pollutants have suggested that settled house dust (SHD) may be a significant source for indoor exposure. Exposure to these pollutants in the indoor environment has been associated with numerous adverse health effects including allergenic and immune system effects, respiratory effects, cardio-vascular and nervous system effects, irritating effects of the skin and mucous membranes.

The central principle of measuring human exposure is easily stated: Measure where the people are. Although obvious, this principle was universally ignored for years. The US Environmental Protection Agency (EPA), for example, from its inception in 1970, measured air on the tops of buildings or in industrial smokestacks and measured water in streams or discharge pipes. Later the EPA developed some personal air quality monitors (McCrone, 1976), and ultimately, spurred on by Congress, it undertook a pioneering set of studies, known as the TEAM studies (for total exposure assessment methodology), that measured human exposure directly for some thousands of people representing several million residents of a dozen or so US cities and towns. Samples referred to as “house dust” varies significantly because house dust may be of different origin, amount, and composition and the method used for analysis may also differ. (Butte & Heinzow, 2002). The analysis and studying of house dust can provide important information to the quality of indoor air.

Collection and Preparation

The filters were taken from the air circulation vents and placed in separate plastic bags and sealed with tape. The bags were labeled with the occupant's zip code. Dust

CHAPTER 3

METHOD AND ANALYSIS

Researchers investigating dust contamination have devised a number of passive and active dust sampling techniques. Passive techniques may involve setting out stationary “dust fall” jars or non-electrostatic plates and simply letting dust accumulate for a given period of time. Active sampling techniques can include: surface wiping, press sampling, sweeping, or vacuuming. Each of these methods has been devised to measure specific parameters such as the total dust loading or dust available for dermal absorption. No one sampling method can collect dust equally well from all surfaces, and optimal collection method will depend on the surface to be sampled and the goal of the study (Wallace, 2001).

The study was carried out in Houston and some of the surrounding areas. The areas were residential with no industrial activities near by. In the study area, several types of houses were present: multi-storey, single floor, houses with many facilities (air-conditioning, air cooling systems, with good ventilation). Sampling was done in several different zip codes (77459, 77085, 77053, 77071, 77053, 77075, 77478, 77498, 77072, 77045, 77083, 77099, 77011, and 77382). The occupants of each resident were asked to give background medical history of any respiratory ailment that they might have. This could include asthma, allergies or bronchitis, etc.

Collection and Preparation

The filters were taken from the air condition vents and place in separate plastic bags and sealed with tape. The bags were labeled with the occupant’s zip code. Dust

from the vacuum cleaners was placed in zip lock bags dated and then sealed. All dust samples were stored at room temperature. Dust samples were collected from vacuum bags and air condition filters. The dust from the vacuum bags were collected and weighed. The weight ranges were from 1.0 grams to 9.5 grams. The dusts from the filters were scraped off with a cell scraper. The weight ranged from 1.0 grams to 8.0 grams. The samples collected were just a percentage of the total dust in from the vacuum bags and on the AC filters. All samples were placed in 10cc glass vials then labeled with ("V") for vacuum sample and ("F") for filter sample. The samples were then prepared with 8cc of Hexane. Hexane isomers are largely unreactive, and are frequently used as an inert solvent in organic reactions because they are very non-polar. All samples were drawn up with a Pasteur pipette and placed in 1.5 cc vials compatible with the GC/MS. The samples were then run through the GC/MS for analysis.

Analysis

The detection method was GC/MS. The GC/MS has the ability to unambiguously identify many chemicals. By breaking down the chemicals into fragments and then identifying these fragments, it was capable of differentiating the different chemicals found. The mass spectra fragments were identified by an online library which was able to identify the different chemical compounds. For each 1.5 cc vial that was sampled there were around 45 chemicals found. Note, only the chemicals that had a purity "correction max percentage" between of 80-100% were catalogued. The chemicals were verified by their Chemical Abstracts Service # or CAS #, and plugged into the NIST Online Databases for further verification. NIST (National Institute of standards and

technology) is a non-regulatory federal agency within the U.S. Department of Commerce. NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. All tables below are a representation of the chemicals found in each dust sample. The "corr% max" represents the purity of the chemical found in each sample. The "indoor source" displays where the dust sample was collected either the air condition filter or vacuum. The "zip code" correlates with what area of town the dust samples were obtained. "WT" is the actual weight of the sample. "Condition" lists any respiratory ailment that the occupants of each home were noted to have asthma, allergies, etc or none. The chemical "cas#" was also listed. Each table lists the "sample #"; which is the number order that it was analyzed by the GC/MS. Below each table, the chemicals are listed by their retention time "R.T.". The products in which the chemicals are used were also provided.

See Tables and Graphs.

RESULTS AND DISCUSSION

Table 1

Zip Code 77459 (Sample #1)

	corr % max	Indoor Source	Zip Code 77459	WT 3.6g	Condition Allergy	cas#	Sample #1
1H-Benzimidazole, 2-methyl	99.72	Filter	“	“	“	000615-15-6	1f
3H-1,2-Dithiol-3-one, 4-methyl	99.72	Filter	“	“	“	000362-10-8	1f
1H-3a,7 Methanoazulene 2,3,4,7,8	85.9	Filter	“	“	“	00469-61-4	1f
Pyrazine, (1-methylethenyl)-	100	Filter	“	“	“	038713-41-6	1f
2-Isopropenylpyrazine	100	Filter	“	“	“	012913-41-6	1f
Benzaldehyde, 4-methyl	100	Filter	“	“	“	000104-87-0	1f
				1.4g			
9,12-Octadecadienoic acid (z,z)	100	Vacuum	“	“	“	000060-33-3	1v
Oleic acid	100	Vacuum	“	“	“	00112-80-1	1v
13-Tetradecenal	100	Vacuum	“	“	“	085896-31-7	1v

1f

R.T. 23.98

1. 1H-3a,7 Methanoazulene 2, 3, 4, 7, 8

used in fragrances

R.T 24.68

1. Pyrazine, (1-methylethenyl)-

2. 2-Isopropenylpyrazine

3. Benzaldehyde, 4-methyl

Volatile flavorings in cigarette

no data

used to improve the flavor
characteristics of tobacco

1v

R.T. 29.45

1. 9, 12-Octadecadienoic acid (z, z)

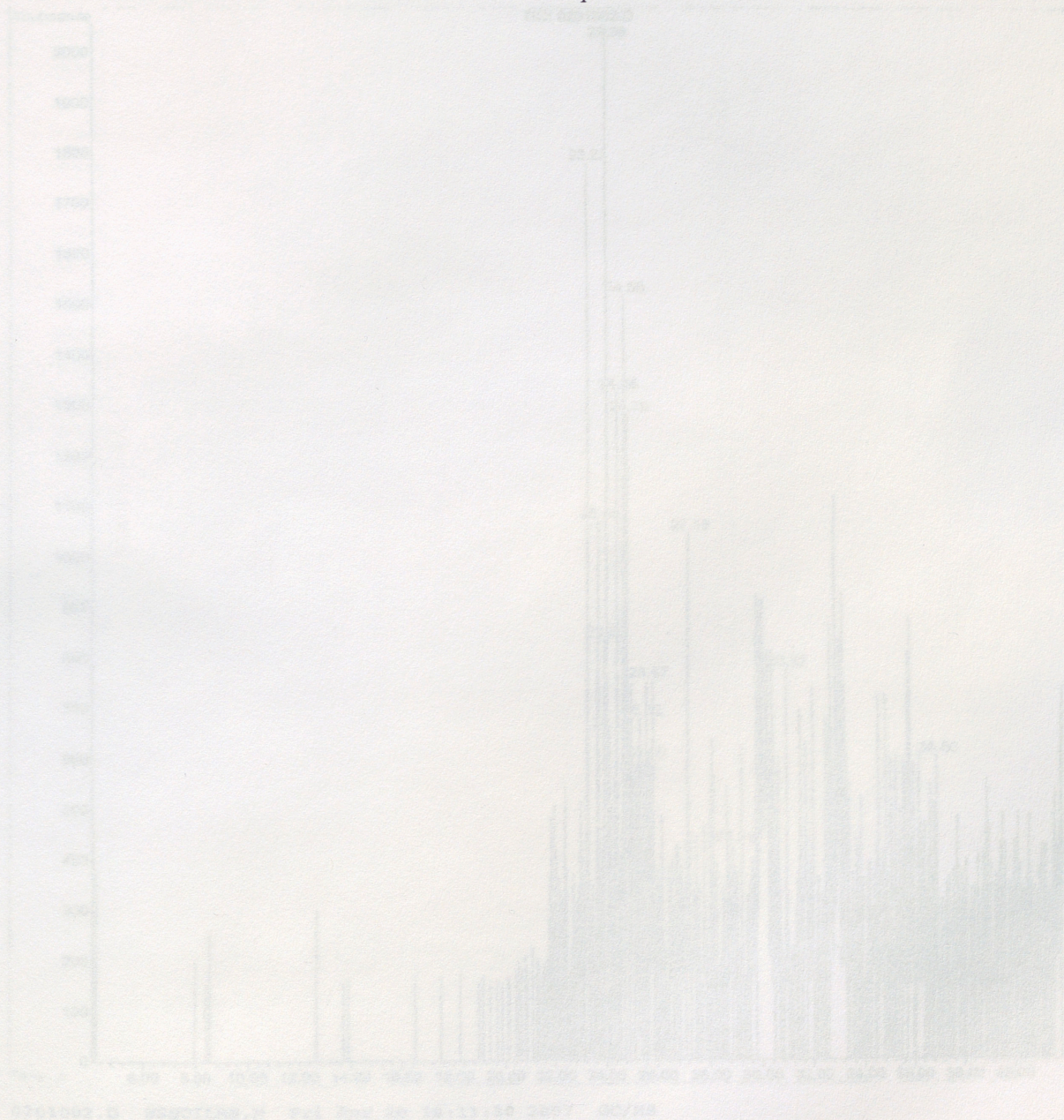
used in manufacturing emulsifying agents

2. Oleic acid

used in manufacturing emulsifying agents

3. 13-Tetradecenal

pesticide for treatment of termites



Graph I
1f (Sample #1)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\0201002.D

Vial: 2

Acq On : 11 Apr 2007 6:49 pm

Operator: Herb Nance

Sample : 1F

Inst : GC/MS Ins

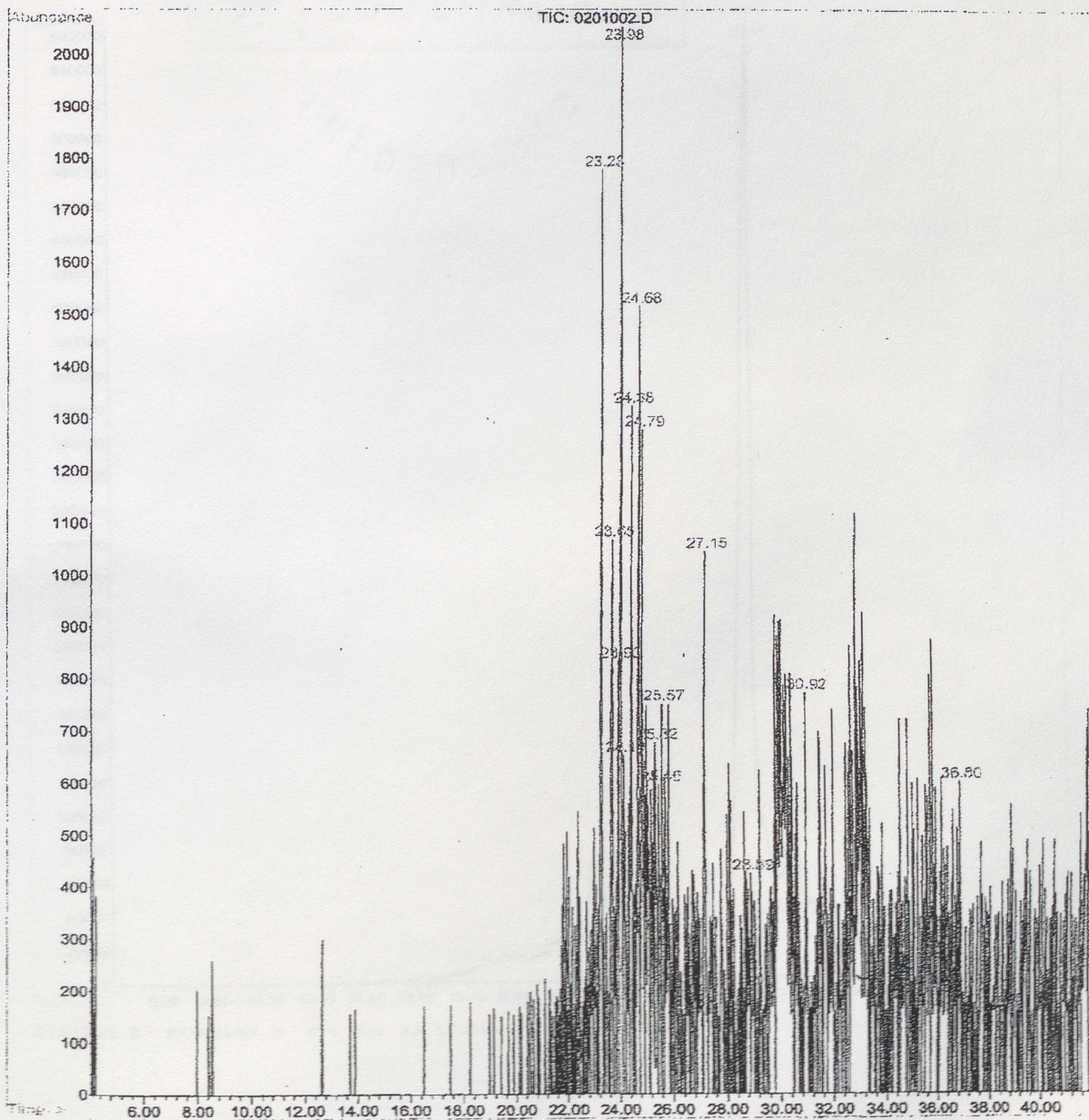
Misc :

Multiplr: 1.00

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

Title : Volitiles

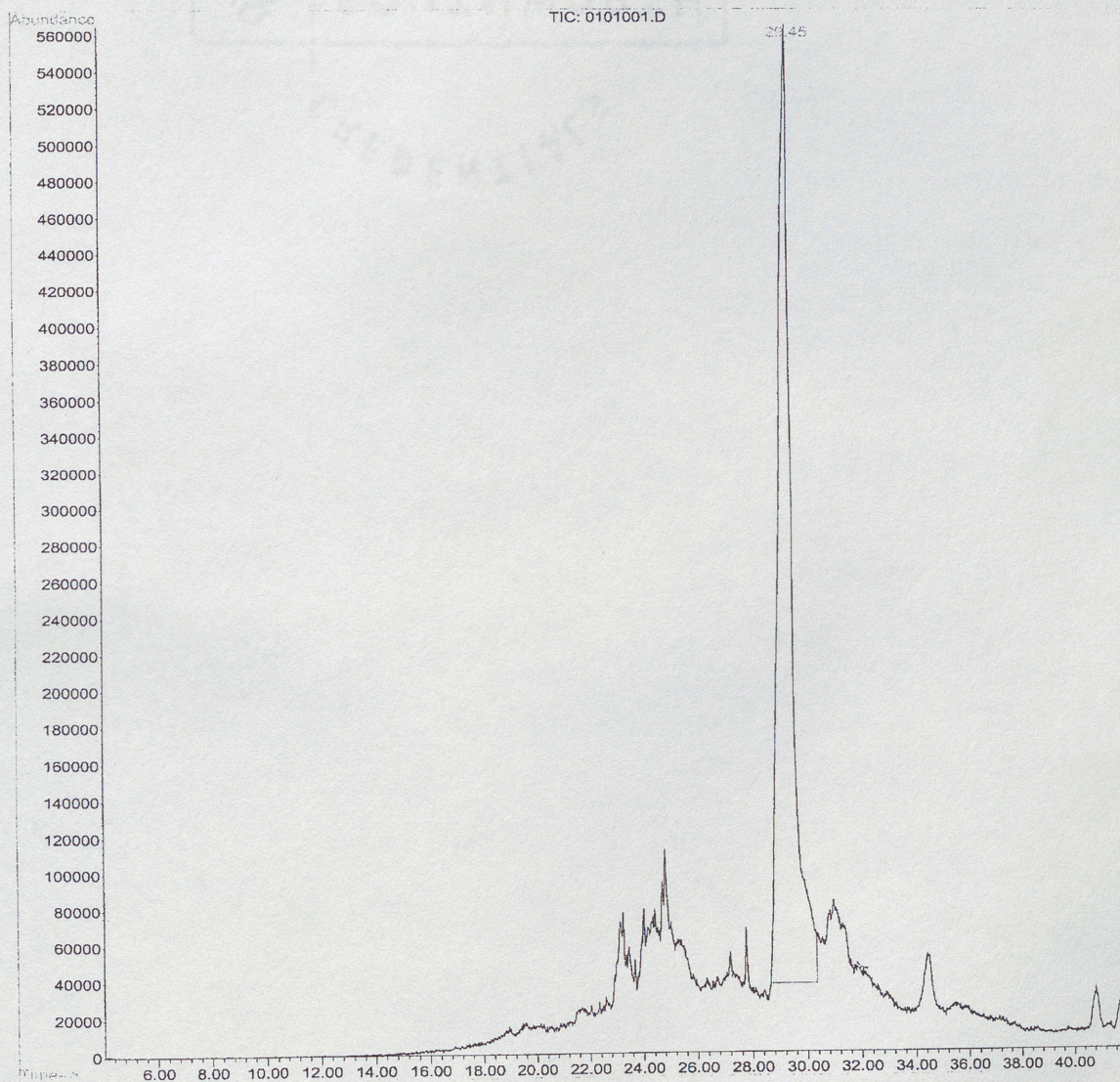


0201002.D ESSOILHS.M Fri Apr 20 18:11:30 2007 GC/MS

Graph II
1v (Sample #1)

Area Percent Report

ata File : C:\HPCHEM\1\DATA\041007\0101001.D Vial: 1
Acq On : 10 Apr 2007 5:27 pm Operator: Herb Nance
Sample : 1V Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volitiles



0101001.D ESSOILHS.M Fri Apr 20 17:52:03 2007 GC/MS

Table 2

Zip Code 77085 (Sample #2)

	corr % max	Indoor Source	Zip Code 77085	WT 4.8g	Condition Asthma	cas#	Sample #2
Heptacosane	100	Filter				00593-49-7	2f
Dotriacontane	100	Filter	"	"	"	00544-85-4	2f
triacontane	100	Filter	"	"	"	00638-68-6	2f
				2.0g			
Triacontane	100	Vacuum	"	"	"	000638-68-6	2v
pentatriacontane	100	Vacuum	"	"	"	000630-07-9	2v
Hexatriacontane	100	Vacuum	"	"	"	000630-06-8	2v

2f

R.T. 26.82

- | | | |
|------------------|----------------|---------|
| 1. Heptacosane | $C_{27}H_{56}$ | no data |
| 2. Dotriacontane | $C_{32}H_{66}$ | no data |
| 3. triacontane | $C_{30}H_{62}$ | no data |

2v

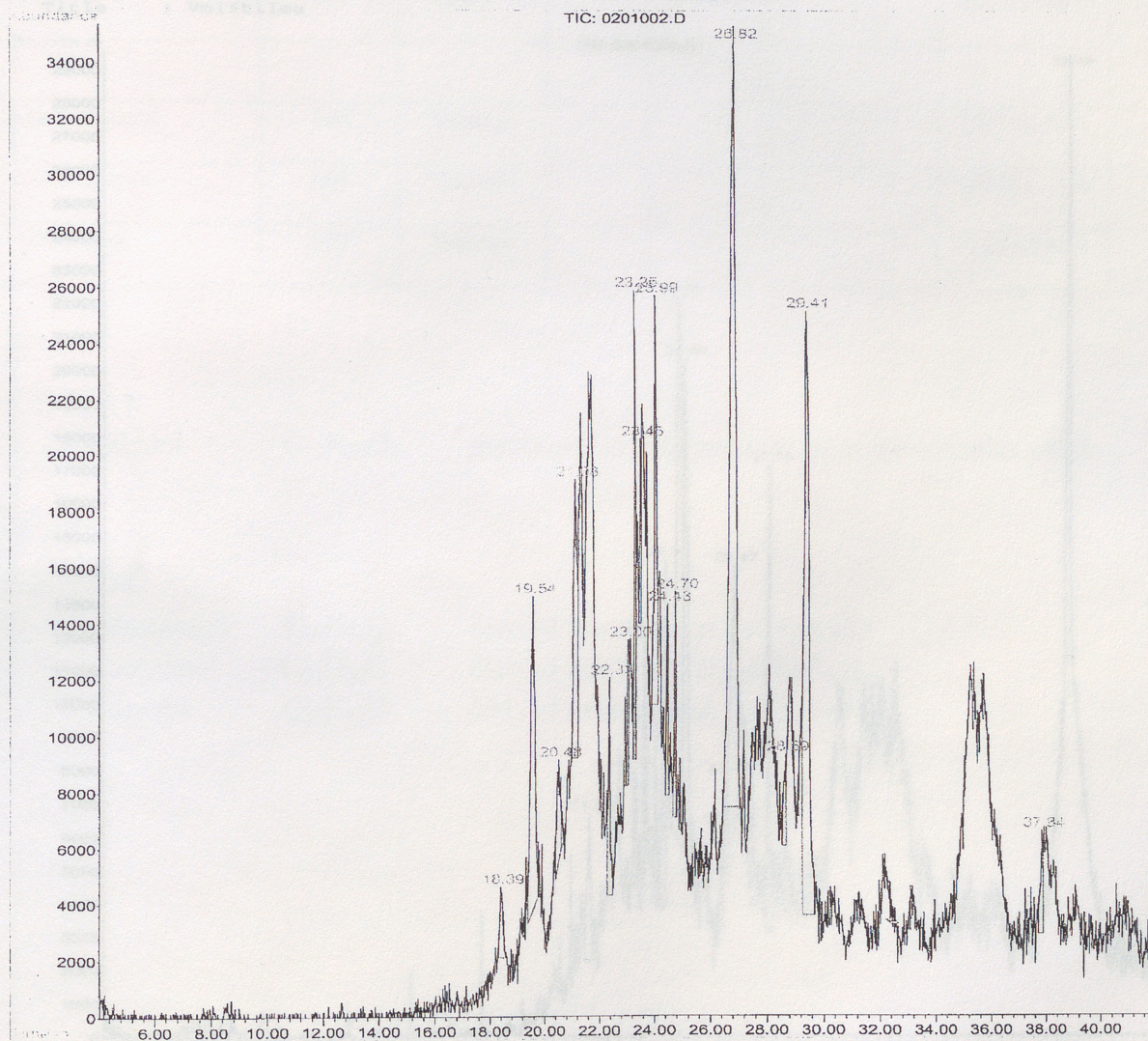
R.T. 20.01

- | | |
|---------------------|---------------------------------|
| 1. Triacontane | no data (straight chain alkane) |
| 2. pentatriacontane | no data (straight chain alkane) |
| 3. Hexatriacontane | no data (straight chain alkane) |

Graph III
2f (Sample #2)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\0201002.D Vial: 2
Acq On : 10 Apr 2007 6:14 pm Operator: Herb Nance
Sample : 2F Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles

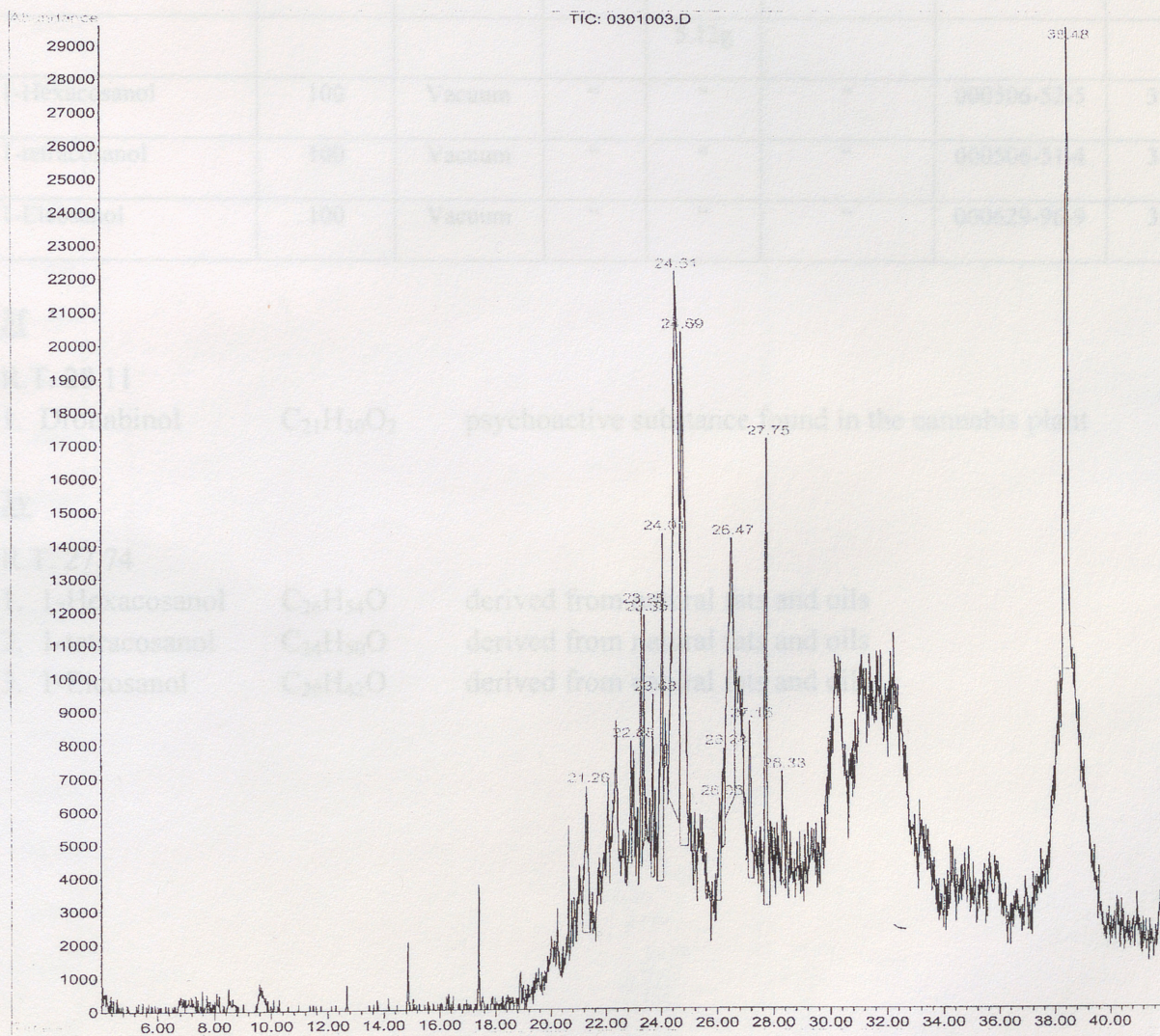


0201002.D ESSOILHS.M Fri Apr 20 17:53:02 2007 GC/MS

Graph IV
2v (Sample #2)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\0301003.D Vial: 3
Acq On : 10 Apr 2007 7:01 pm Operator: Herb Nance
Sample : 2V Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



0301003.D ESSOILHS.M Fri Apr 20 17:55:02 2007 GC/MS

Table 3

Zip Code 77053 (Sample #3)

	corr % max	Indoor Source	Zip Code 77053	WT 3.10	Condition none	cas#	Sample #3
Dronabinol	100	Filter	“	“	“	001972-08-3	3f
				5.12g			
1-Hexacosanol	100	Vacuum	“	“	“	000506-52-5	3v
1-tetracosanol	100	Vacuum	“	“	“	000506-51-4	3v
1-Eicosanol	100	Vacuum	“	“	“	000629-96-9	3v

3f

R.T. 28.11

1. Dronabinol $C_{21}H_{30}O_2$ psychoactive substance found in the cannabis plant**3v**

R.T. 27.74

1. 1-Hexacosanol $C_{26}H_{54}O$ derived from natural fats and oils
2. 1-tetracosanol $C_{24}H_{50}O$ derived from natural fats and oils
3. 1-Eicosanol $C_{20}H_{42}O$ derived from natural fats and oils

Graph V
3f (Sample #3)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\0401004.D

Vial: 4

Acq On : 10 Apr 2007 7:47 pm

Operator: Herb Nance

Sample : 3F

Inst : GC/MS Ins

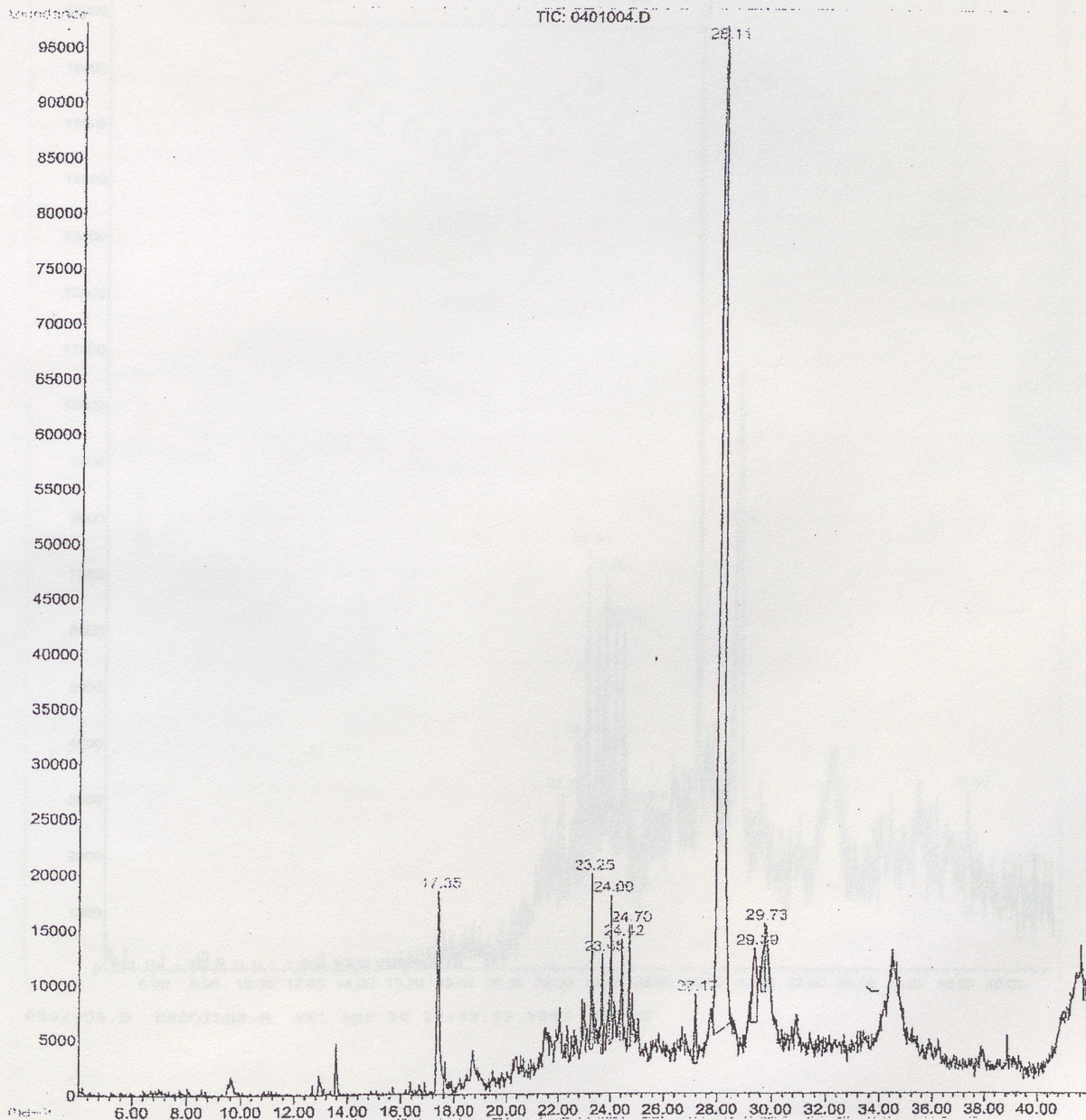
Misc :

Multiplr: 1.00

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

Title : Volatiles



401004.D ESSOILHS.M Fri Apr 20 17:55:23 2007 GC/MS

Graph VI

3v (Sample #3)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\0501005.D

Acq On : 10 Apr 2007 8:34 pm

Sample : 3V

Misc :

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

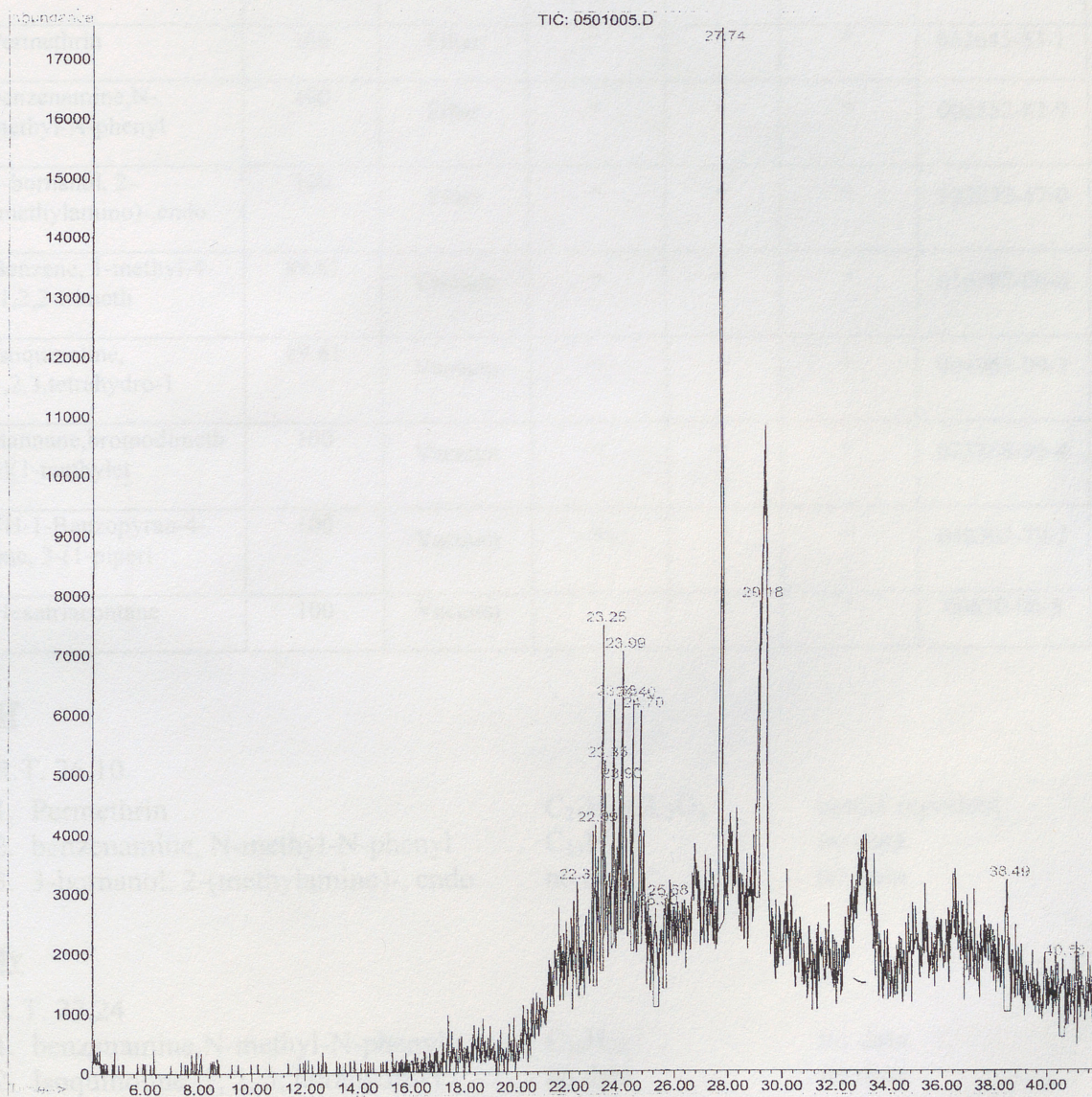
Title : Volatiles

Vial: 5

Operator: Herb Nance

Inst : GC/MS Ins

Multiplr: 1.00



0501005.D ESSOILHS.M Fri Apr 20 17:55:52 2007 GC/MS

Table 4

Zip Code Unknown (Sample #4)

	corr % max	Indoor Source	Zip Code Not published	WT 6.4g	Condition none	cas#	Sample #4
Permethrin	100	Filter	“	“	“	052645-53-1	4f
benzenamine,N-methyl-N-phenyl	100	Filter	“	“	“	000552-82-9	4f
3-bornanol, 2-(methylamino)-,endo	100	Filter	“	“	“	032232-17-0	4f
Benzene, 1-methyl-4-(1,2,2-trimeth	89.61	Vacuum	“	“	“	016982-00-6	4v
Isoquinoline, 1,2,3,tetrahydro-1	89.61	Vacuum	“	“	“	004965-09-7	4v
stannane,bromodimethyl(1-methylet	100	Vacuum	“	“	“	023268-96-4	4v
4H-1-Benzopyran-4-one, 3-(1-piperi	100	Vacuum	“	“	“	040302-79-2	4v
Hexatriacontane	100	Vacuum	“	“	“	00630-06-8	4v

4f

R.T. 26.10

1. Permethrin	$C_{21}H_{20}Cl_2O_3$	insect repellent
2. benzenamine, N-methyl-N-phenyl	$C_{13}H_3N$	no data
3. 3-bornanol, 2-(methylamino)-, endo	no data	no data

4v

R.T. 23.24

1. benzenamine,N-methyl-N-phenyl	$C_{15}H_{22}$	no data
2. Isoquinoline, 1, 2, 3, tetrahydro-1	no data	no data

R.T. 24.41

1. stannane,bromodimethyl(1-methylet	no data	no data
2. 4H-1-Benzopyran-4-one, 3-(1-piperi	no data	no data
3. Hexatriacontane	$C_{36}H_{74}$	straight chain alkane

Graph VII
4f (Sample #4)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\0601006.D

Vial: 6

Acq On : 10 Apr 2007 9:21 pm

Operator: Herb Nance

Sample : 4F

Inst : GC/MS Ins

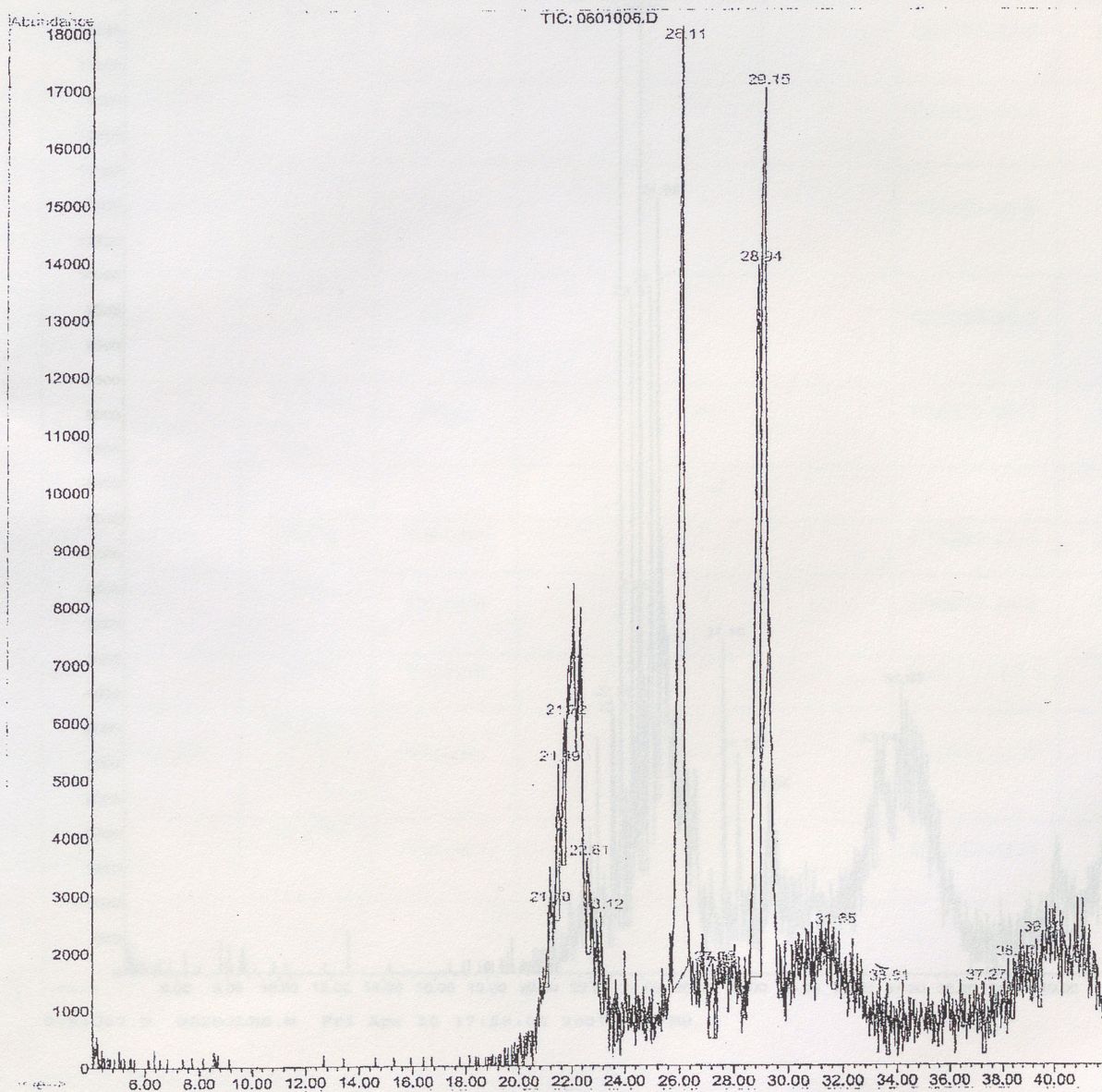
Misc :

Multiplr: 1.00

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

Title : Volatiles



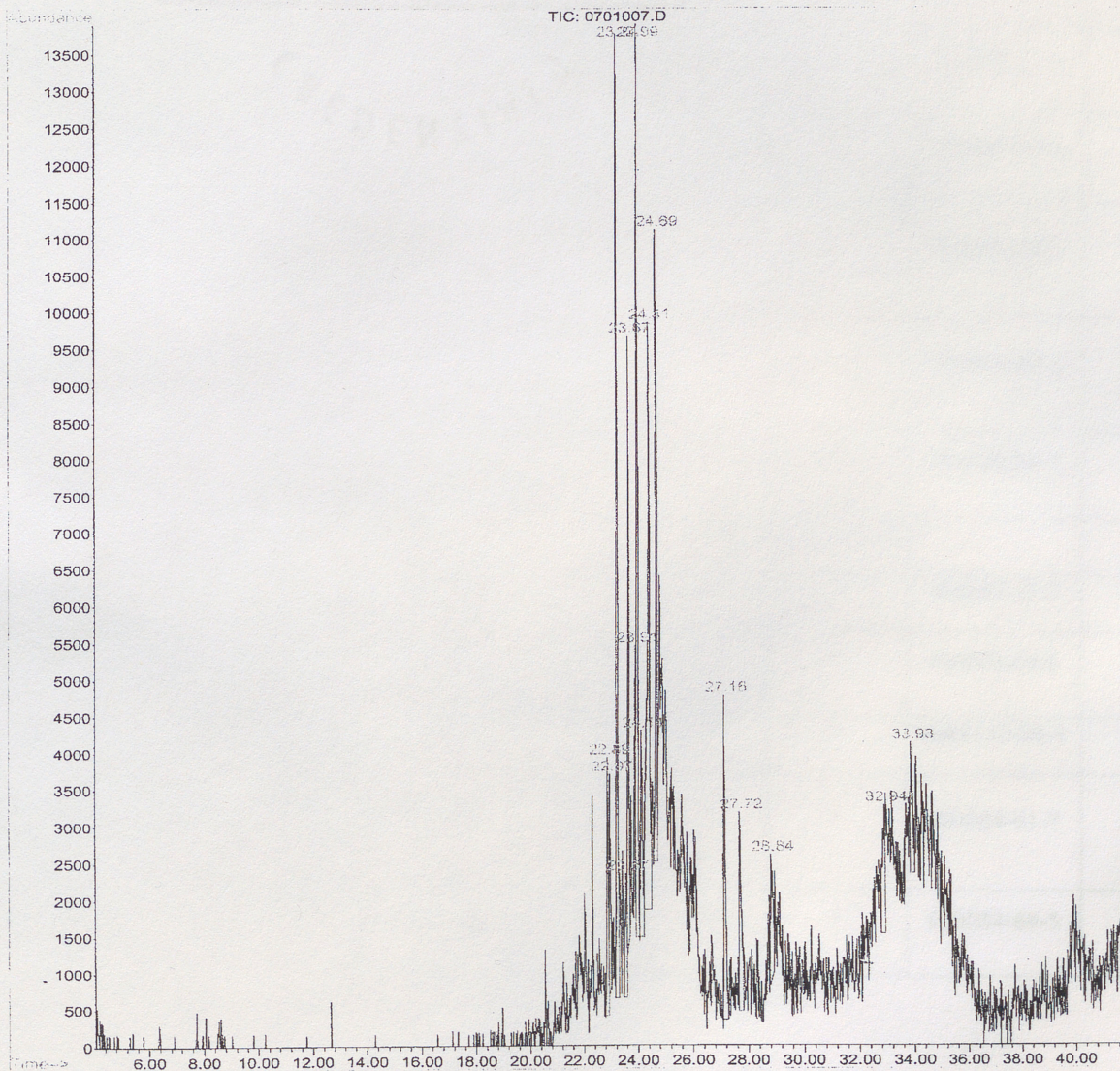
0601006.D ESSOILHS.M Fri Apr 20 17:56:27 2007 GC/MS

Graph VIII

4v (Sample #4)

Area Percent Report

File : C:\HPCHEM\1\DATA\041007\0701007.D Vial: 7
Acq On : 10 Apr 2007 10:07 pm Operator: Herb Nance
Sample : 4V Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



0701007.D ESSOILHS.M Fri Apr 20 17:58:08 2007 GC/MS

Table 5

Zip Code 77071 (Sample #5)

	corr % max	Indoor Source	Zip Code 77071	WT 3.1g	Condition Allergy	cas#	Sample #5
Benzenamine, 4-cyclohexyl	100%	Filter	"	"	"	006373-50-8	5f
Benzene, 1-methyl-4-(1-methylethen	100%	Filter	"	"	"	001195-32-0	5f
Benzene, 1-methyl-4-(1,2,2-trimeth	100%	Filter	"	"	"	016982-00-6	5f
1-Piperazinepropanenitrile, beta.	97.71%	Filter	"	"	"	000000-00-0	5f
5H-1,3,4-thiadiazolo[3,2-a]pyrimidin	97.70%	Filter	"	"	"	092919-60-3	5f
Natphthalene, 1,2,3,4a,7-hexahydr	97.71%	Filter	"	"	"	016728-99-7	5f
				1.2g			
octadecane, 1-chloro	100%	Vacuum	"	"	"	003386-33-2	5v
Cetylpyridinium Chloride	100%	Vacuum	"	"	"	006004-24-6	5v
1-Octadecene	100%	Vacuum	"	"	"	0001112-88-9	5v
1,2-Benzenedicarboxylic acid, dicy	89.27%	Vacuum	"	"	"	000084-61-7	5v
Phthalic acid, Diisooctyl ester	89.27%	Vacuum	"	"	"	000084-69-5	5v

5F

R.T. 23.23

1. Benzenamine, 4-cyclohexyl	C ₁₂ H ₁₇ N	no data
2. Benzene, 1-methyl-4-(1-methylethen	no data	no data
3. Benzene, 1-methyl-4-(1, 2, 2-trimeth	no data	no data

R.T. 23.33

1. 1-Piperazinepropanenitrile,.beta.	no data	no data
2. 5H-1,3,4,-thiadiazolo[3,2-a]pyramid	no data	no data
3. Natphthalene, 1, 2, 3, 4a, 7-hexahydr	no data	no data

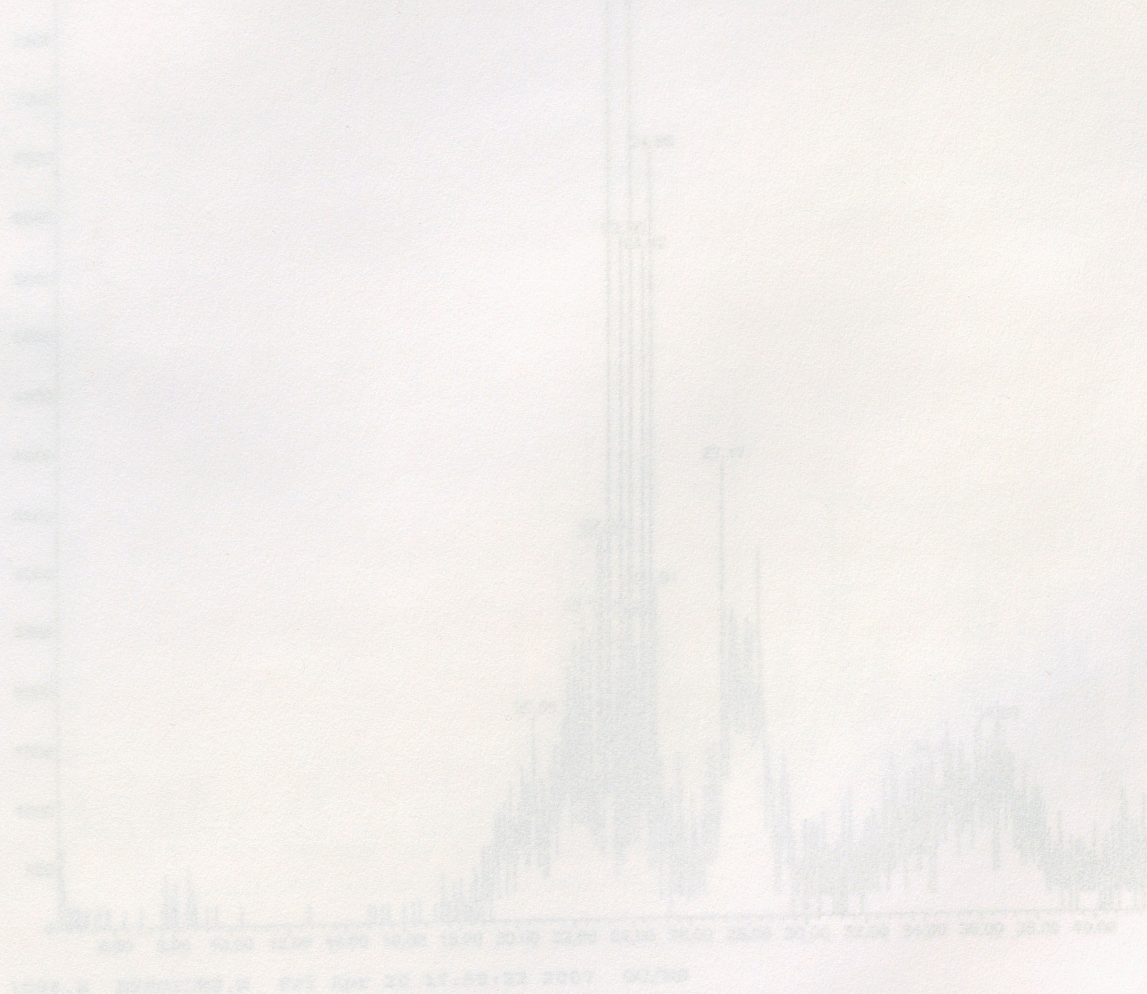
5v

R.T. 23.34

1. octadecane, 1-chloro	$C_{18}H_{37}Cl$	no data
2. Cetylpyridinium Chloride	no data	no data
3. 1-Octadecene	no data	no data

R.T. 24.81

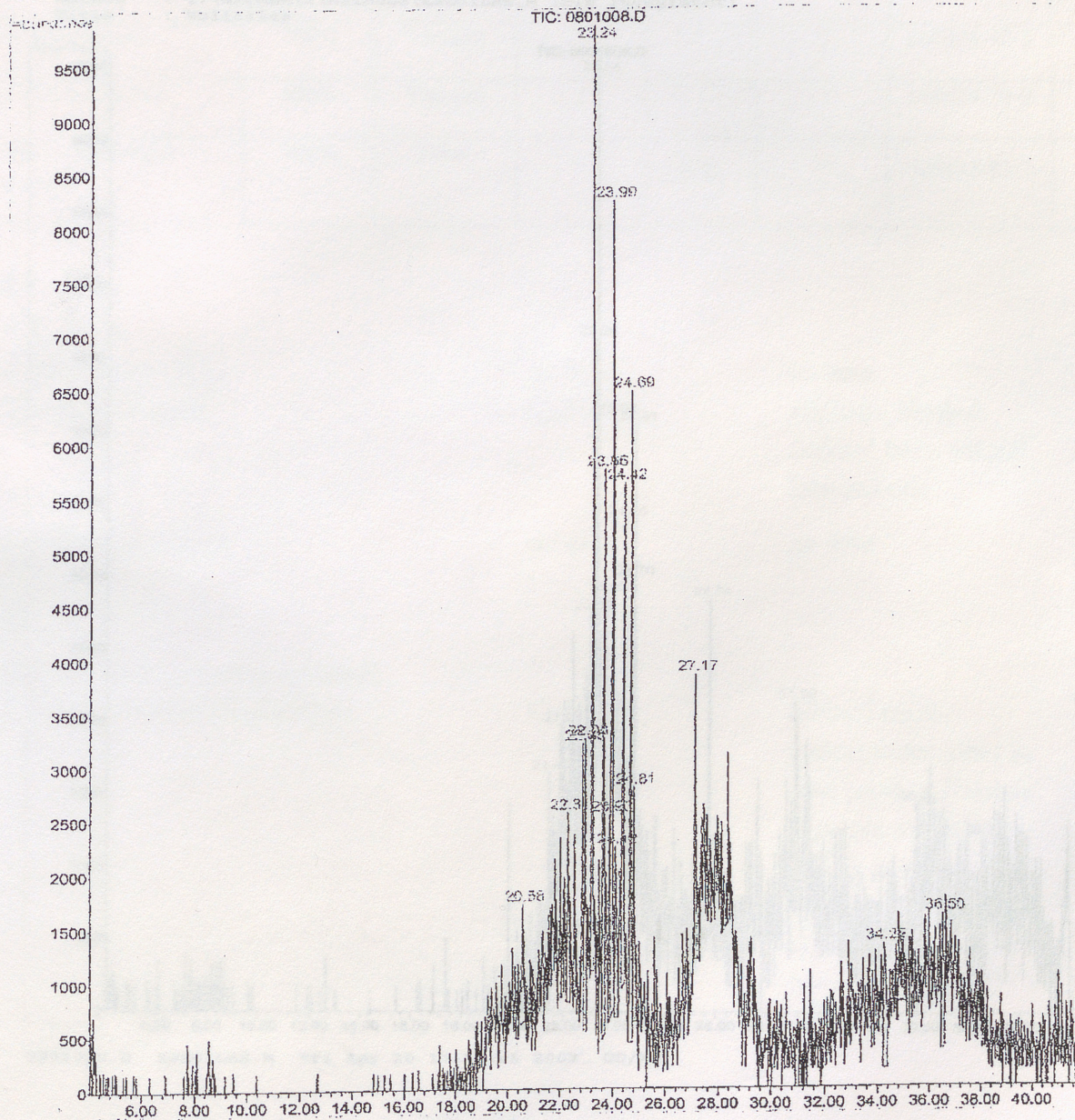
1. 1, 2-Benzenedicarboxylic acid, dicy	$C_{20}H_{26}O_4$	no data
2. Phthalic acid, Diisooctyl ester	no data	no data



Graph IX 5f (Sample #5)

Area Percent Report

File : C:\HPCHEM\1\DATA\041007\0801008.D Vial: 8
On : 10 Apr 2007 10:54 pm Operator: Herb Nance
Sample : 5F Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\SSOILHS.M (RTE Integrator)
Title : Volatiles

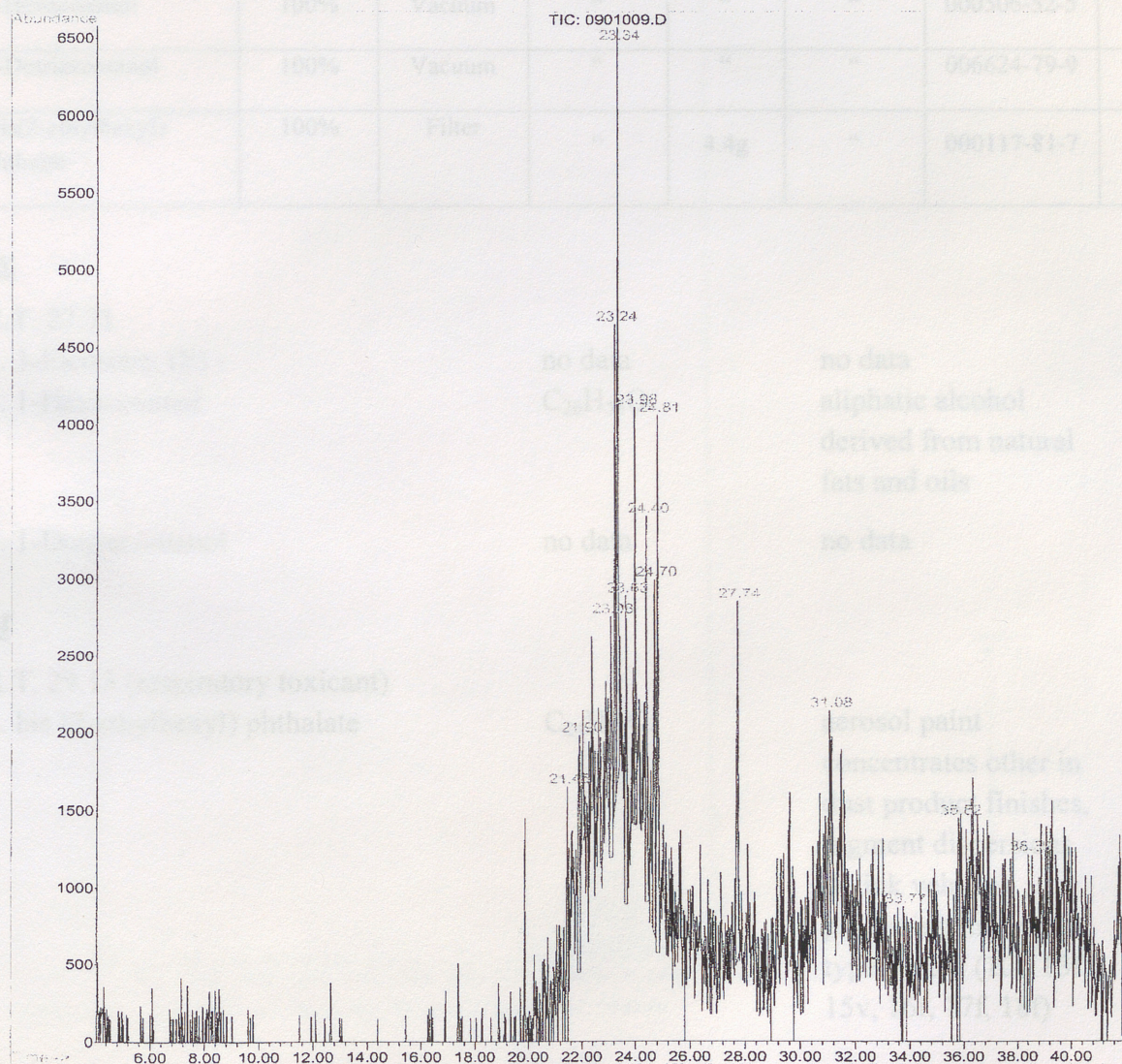


1008.D SSOILHS.M Fri Apr 20 17:58:22 2007 GC/MS

Graph X 5v (Sample #5)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\0901009.D Vial: 9
 Acq On : 10 Apr 2007 11:41 pm Operator: Herb Nance
 Sample : 5V Inst : GC/MS Ins
 Misc : Multiplr: 1.00
 MS Integration Params: RTEINT.P
 Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
 Title : Volatiles



0901009.D ESSOILHS.M Fri Apr 20 17:58:45 2007 GC/MS

Table 6

Zip Code 77053 (Sample #6)

	corr % max	Indoor Source	Zip Code 77053	WT 3.6g	Condition Allergy	cas#	Sample #6
3-Eicosene, (E)-	100%	Vacuum	"	3.6g	"	074685-33-9	6v
1-Hexacosanol	100%	Vacuum	"	"	"	000506-52-5	6v
1-Dotriacontanol	100%	Vacuum	"	"	"	006624-79-9	6v
Bis(2-ethylhexyl) phthalte	100%	Filter	"	4.4g	"	000117-81-7	6f

6v

R.T. 27.71

1. 3-Eicosene, (E) -

no data

no data

2. 1-Hexacosanol

 $C_{26}H_{54}O$ aliphatic alcohol
derived from natural
fats and oils

3. 1-Dotriacontanol

no data

no data

6f

R.T. 29.13 (respiratory toxicant)

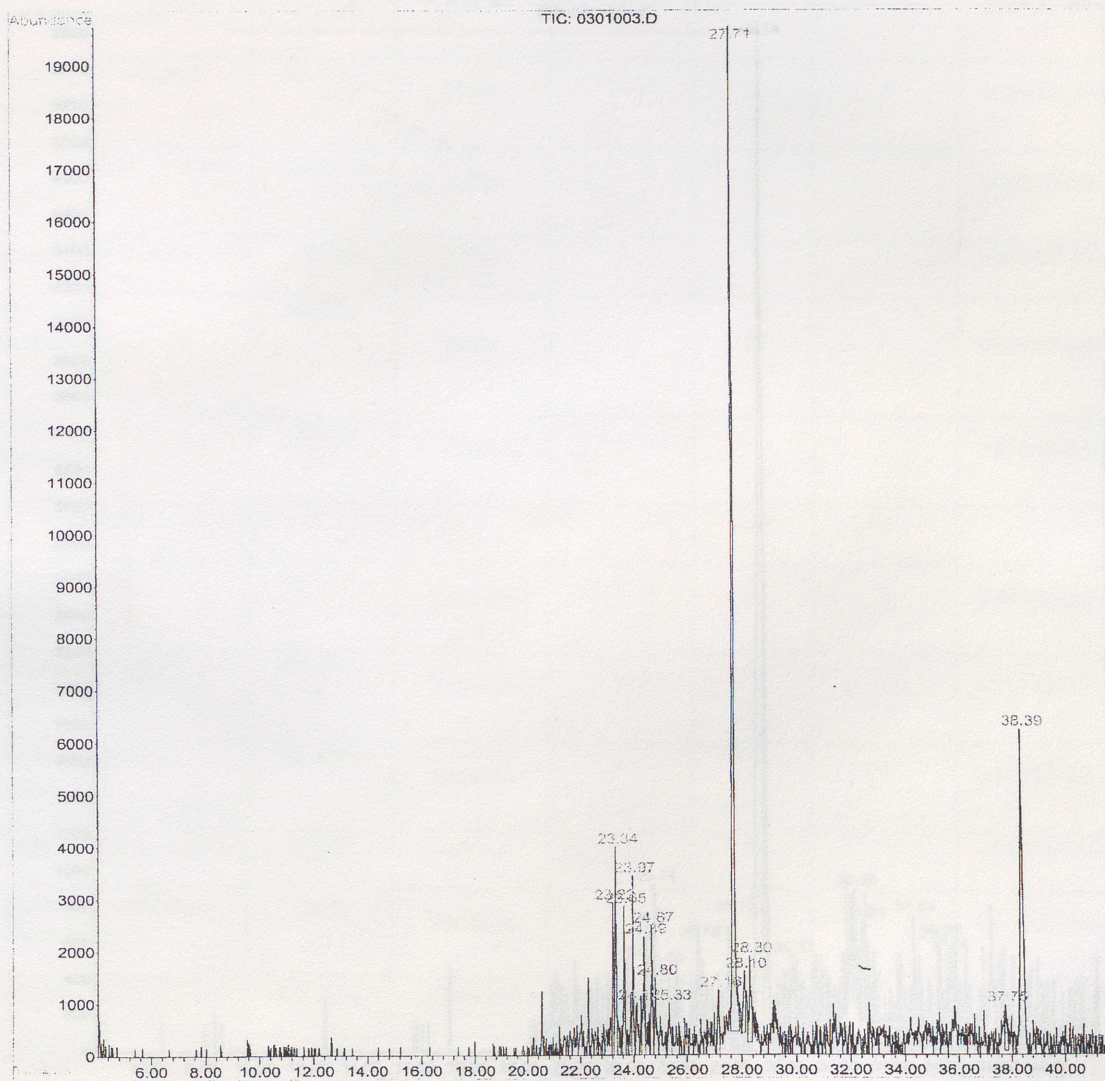
1. bis (2-ethylhexyl) phthalate

 $C_{24}H_{38}O_4$ aerosol paint
concentrates other in
dust product finishes,
pigment dispersions
& ink vehicles
packaging inks water
types noted (10f, 13f,
15v, 16f, 17f, 18f)

Graph XI
6v (Sample #6)

Area Percent Report

File : C:\HPCHEM\1\DATA\041107\0301003.D Vial: 3
On : 11 Apr 2007 7:36 pm Operator: Herb Nance
Sample : 6V Inst : GC/MS Ins
disc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



0301003.D ESSOILHS.M Fri Apr 20 18:12:38 2007 GC/MS

Table 7

Zip Code 77075 (Sample #7)

	corr % max	Indoor Source	Zip Code 77075	WT 3.1g	Condition Asthma	cas#	Sample #7
2-Butanone, 4-(2,3-dihydro-1H-indo	82.83%	Filter	“	“	“	040135-92-0	7f
Benzene, 1-ethenyl-3,5-dimethyl-	82.83%	Filter	“	“	“	005379-20-4	7f
benzenamine, 3-cyclohexyl-	82.83%	Filter	“	“	“	006373-50-8	7f
phenol, 2,4,6-trinitro-	100%	Filter	“	“	“	000088-89-1	7f
5H-1,3,4-thiadiazolo[3,2-a]pyrimidin	100%	Filter	“	“	“	092919-60-3	7f
Cyclooctene, 5,6-diethenyl	100%	Filter	“	“	“	046045-35-6	7f
				3.6g			
6-Octenal, 3,7-dimethyl	86.64%	Vacuum	“	“	“	000106-23-0	7v
cyclohexane, (1,2-dimethylbutyl)-	86.64%	Vacuum	“	“	“	061142-37-8	7v
8-heptadecene, 1-chloro-	86.64%	Vacuum	“	“	“	056554-80-4	7v
2-heptanol, 4-methyl	100%	Vacuum	“	“	“	056298-90-9	7v
1-pentanol, 4-methyl-2-methylene-	100%	Vacuum	“	“	“	000000-00-0	7v
1-tetradecanol	89.58%	Vacuum	“	“	“	000112-72-1	7v
Hexadecane, 1-chloro	89.58%	Vacuum	“	“	“	004860-03-1	7v
1-Tetracosanol	89.58%	Vacuum	“	“	“	000506-51-4	7v

7f

R.T. 23.98

1. phenol,2,4,6-trinitro-	$C_6H_3N_3O_7$	laboratory reagent, in making dyes, and rocket fuel and explosives
2. 5H-1, 3, 4,-thiadiazolo[3,2-a]pyrimid	no data	no data
3. Cyclooctene, 5,6-diethenyl	no data	no data

R.T. 23.24

1. 2-Butanone, 4-(2,3-dihydro-1H-indo	no data	no data
2. Benzene, 1 -ethenyl-3,5-dimethyl-	$C_{10}H_{12}$	no data
3. benzenamine ,3-cyclo hexyl-	$C_{12}H_{17}N$	no data

7y

R.T. 24.70

1. 6-Octenal, 3,7 dimethyl	$C_{10}H_{18}O$	used as consumer pest control
2. cyclohexane, (1,2-dimethylbutyl)-	$C_{12}H_{24}$	used in wide range household, craft and industrial products
3. 8-heptadecene, 1-chloro-	no data	no data

R.T. 29.90

1. 2-heptanol, 4-methyl	no data	no data
2. 1-pentanol, 4-methyl-2-methylene-	no data	no data

R.T. 30.91

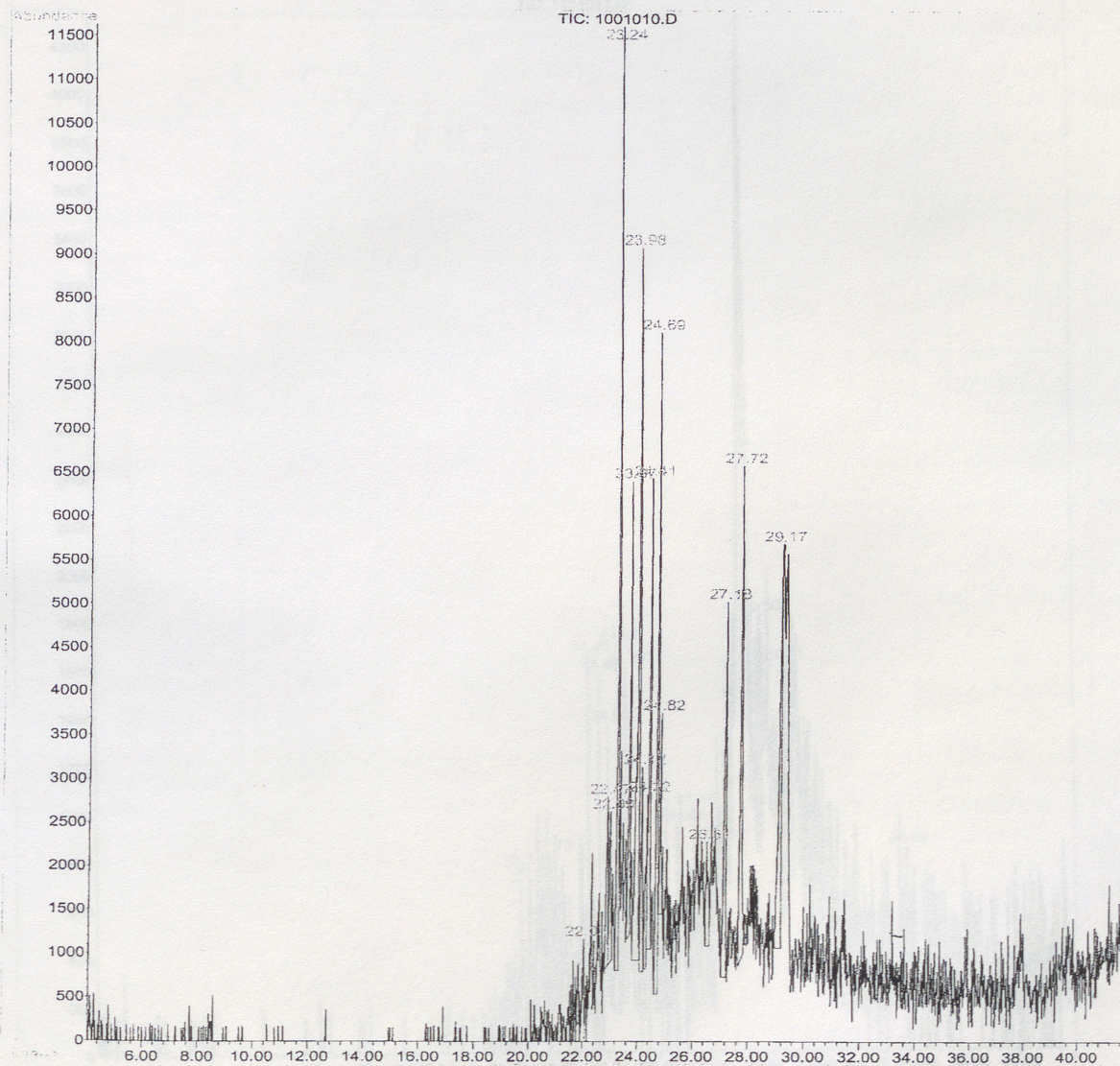
1. 1-tetradecanol	$C_{14}H_{30}O$	fatty alcohols, used as an ingredients in cosmetics such as cold cream
2. Hexadecane, 1-chloro	$C_{16}H_{33}Cl$	high volume chemical
3. 1-Tetracosanol	$C_{24}H_{50}O$	aliphatic alcohol derived from natural and fats and oils.

Graph XIII

7f (Sample #7)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\1001010.D Vial: 10
Acq On : 11 Apr 2007 12:27 am Operator: Herb Nance
Sample : 7F Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles

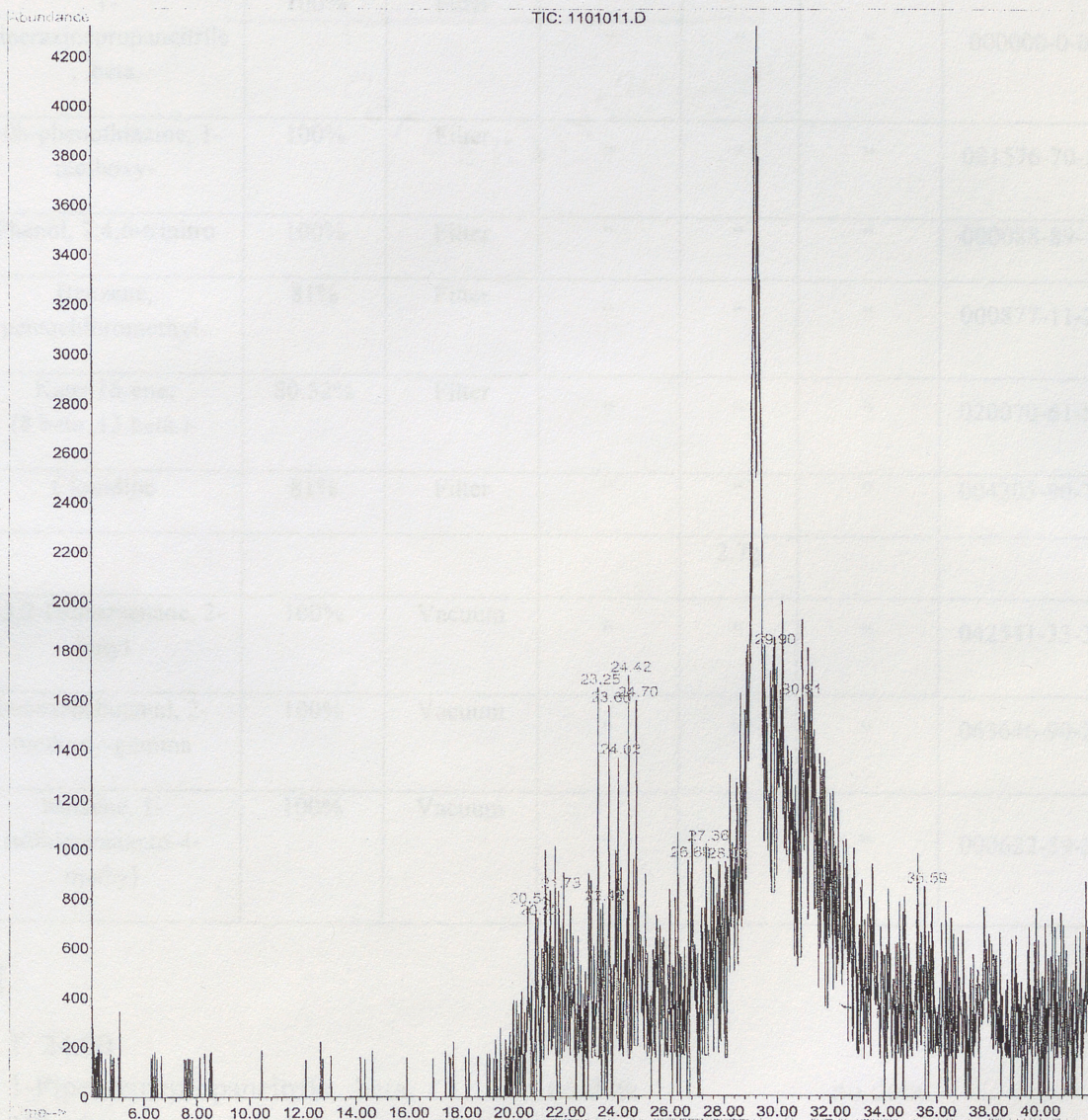


1001010.D ESSOILHS.M Fri Apr 20 18:00:08 2007 GC/MS

Graph XIV 7v (Sample #7)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\1101011.D Vial: 11
Acq On : 11 Apr 2007 1:14 am Operator: Herb Nance
Sample : 7V Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



1101011.D ESSOILHS.M Fri Apr 20 18:02:28 2007 GC/MS

Table 8

Zip Code 77478 (Sample #8)

	corr % max	Indoor Source	Zip Code 77478	WT 2.3g	Condition Asthma	cas#	Sample #8
1- Piperazinepropaneitrile , .beta.	100%	Filter	“	“	“	000000-0-0	8f
10h-phenothiazine, 1- methoxy-	100%	Filter	“	“	“	001576-70-1	8f
Phenol, 2,4,6-trinitro	100%	Filter	“	“	“	000088-89-1	8f
Benzene, pentachloromethyl-	81%	Filter	“	“	“	000877-11-2	8f
Kaur-16-ene, (8.beta.,13.beta.)-	80.52%	Filter	“	“	“	020070-61-5	8f
Clonidine	81%	Filter	“	“	“	004205-90-7	8f
				2.7g			
1,3,2-Dioxarsenane, 2- butyl	100%	Vacuum	“	“	“	042541-33-3	8v
benezenebutanal, 2- methoxy-gamma	100%	Vacuum	“	“	“	063646-90-2	8v
benzene, 1- isothiocyanato-4- methyl	100%	Vacuum	“	“	“	000622-59-3	8v

8f

R.T. 24.00

- 1-Piperazinepropaneitrile, .beta.
- 10h-phenothiazine, 1-methoxy-
- Phenol, 2, 4, 6-trinitro

no data
no data
 $C_6H_3N_3O_7$

no data
no data
laboratory reagent, in
making dyes a Rocket
fuel and explosives
(noted 7f)

R.T. 24.42

1. Benzene, pentachloromethyl-	$C_7H_3Cl_5$	no data
2. Kaur-16-ene, (8.beta., 13.beta.)-	no data	no data
3. Clonidine	$C_9H_9Cl_{12}N_3$	no data

8v

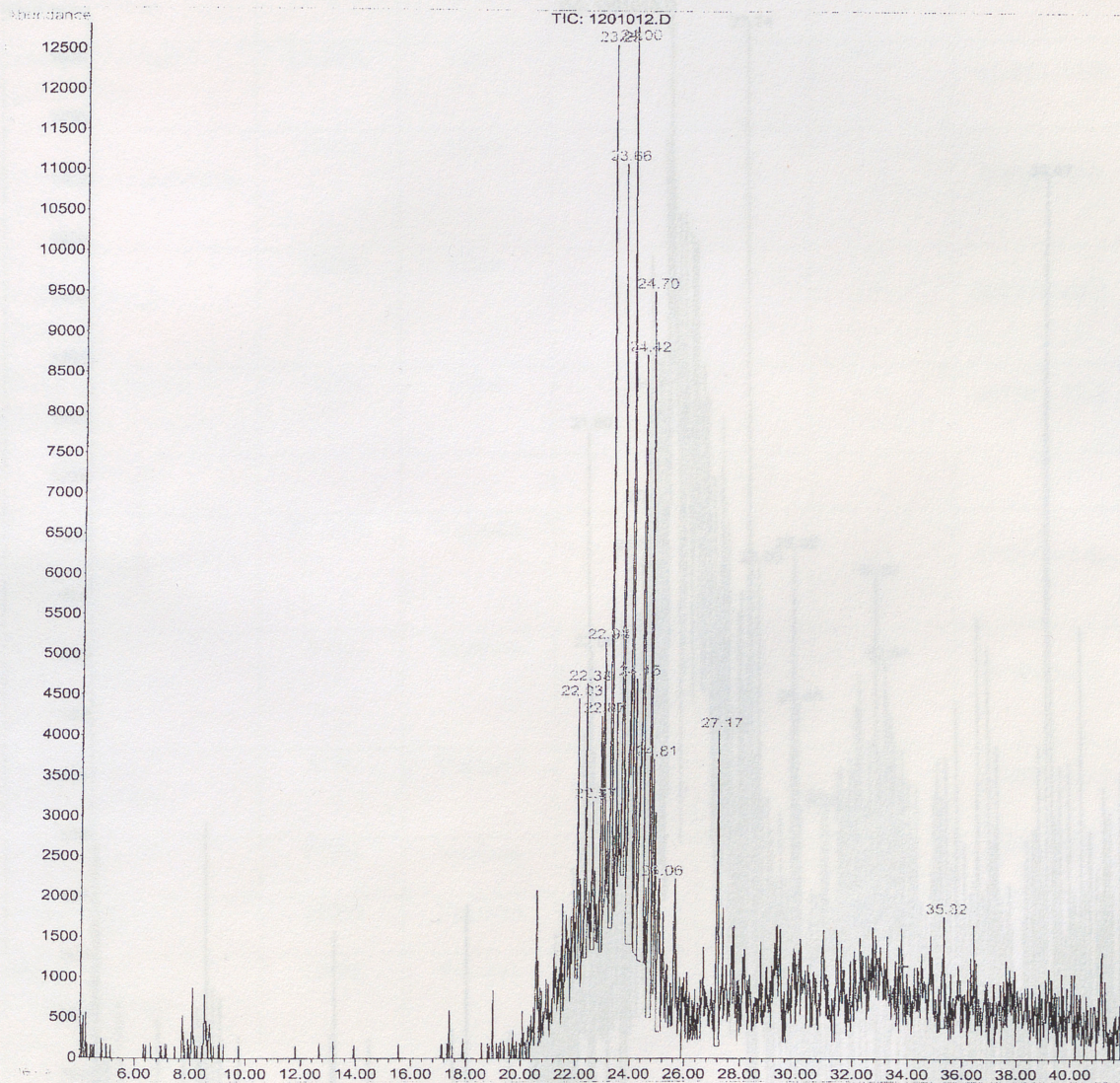
R.T. 38.47

1. 1,3,2-Dioxarsenane, 2- butyl	no data	no data
2. benzenebutanal, 2-methoxy-gamma	no data	no data
3. benzene, 1-isothiocyanato-4-methyl	no data	no data

Graph XV
8f (Sample #8)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\1201012.D Vial: 12
Acq On : 11 Apr 2007 2:01 am Operator: Herb Nance
Sample : 8F Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



201012.D ESSOILHS.M Fri Apr 20 18:02:59 2007 GC/MS

Graph XVI
8v (Sample #8)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\1301013.D

Acq On : 11 Apr 2007 2:47 am

Sample : 8V

Misc :

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

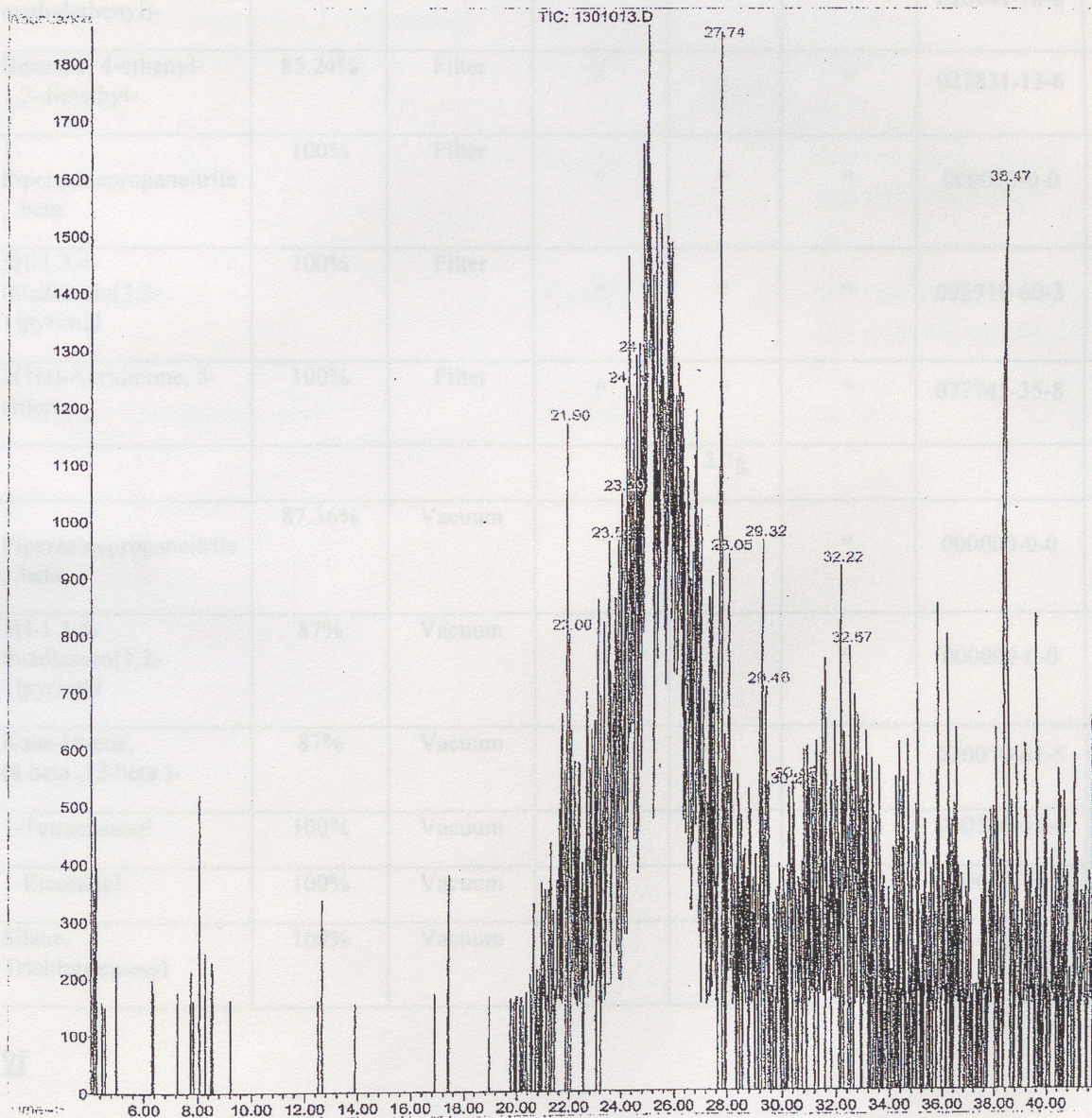
Title : Volatiles

Vial: 13

Operator: Herb Nance

Inst : GC/MS Ins

Multiplr: 1.00



1301013.D ESSOILHS.M Fri Apr 20 18:03:35 2007 GC/MS

1. Benzene, methyl (1-methylbenzene)

C₇H₈

no data

2. Benzene, 4-ethyl-1,2-dimethyl-

C₁₀H₁₄

no data

Table 9

Zip Code 77053 (Sample #9)

	corr % max	Indoor Source	Zip Code 77053	WT 1.0g	Condition none	cas#	Sample #9
Benzene, methyl (1-methylethenyl)-	85.24%	Filter	“	“	“	026444-18-8	9f
Benzene, 4-ethenyl-1,2-dimethyl-	85.24%	Filter	“	“	“	027831-13-6	9f
1-Piperazinepropaneitrile, .beta.	100%	Filter	“	“	“	000000-0-0	9f
5H-1,3,4-thiadiazolo[3,2-1]pyrimid	100%	Filter	“	“	“	092919-60-3	9f
2(1H)-Acridinone, 5-chloro-	100%	Filter	“	“	“	077745-35-8	9f
				2.7g			
1-Piperazinepropaneitrile, .beta.	87.36%	Vacuum	“	“	“	000000-0-0	9v
5H-1,3,4-thiadiazolo[3,2-1]pyrimid	87%	Vacuum	“	“	“	000000-0-0	9v
Kaur-16-ene, (8.beta.,13.beta.)-	87%	Vacuum	“	“	“	020070-61-5	9v
1-Tetracosanol	100%	Vacuum	“	“	“	000506-51-4	9v
1-Eicosanol	100%	Vacuum	“	“	“	000629-96-9	9v
Silane, Trichloroeicosyl	100%	Vacuum	“	“	“	018733-57-8	9v

9f

R.T. 23.24

1. Benzene, methyl (1-methylethenyl)-

C₁₀H₁₂

no data

2. Benzene, 4-ethenyl-1,2-dimethyl-

C₁₀H₁₂

no data

R.T. 24.00

1. 1-Piperazinepropaneitrile, .beta.	no data	no data
2. 5H-1,3,4-thiadiazolo[3,2-1]pyramid	no data	no data
3. 2(1H)-Acridinone, 5-chloro-	no data	no data

9v

R.T. 23.99

1. 1-Piperazinepropaneitrile, .beta.	no data	no data
2. 5H-1,3,4-thiadiazolo[3,2-1]pyramid	no data	no data
3. Kaur-16-ene, (8.beta.,13.beta.)-	no data	no data

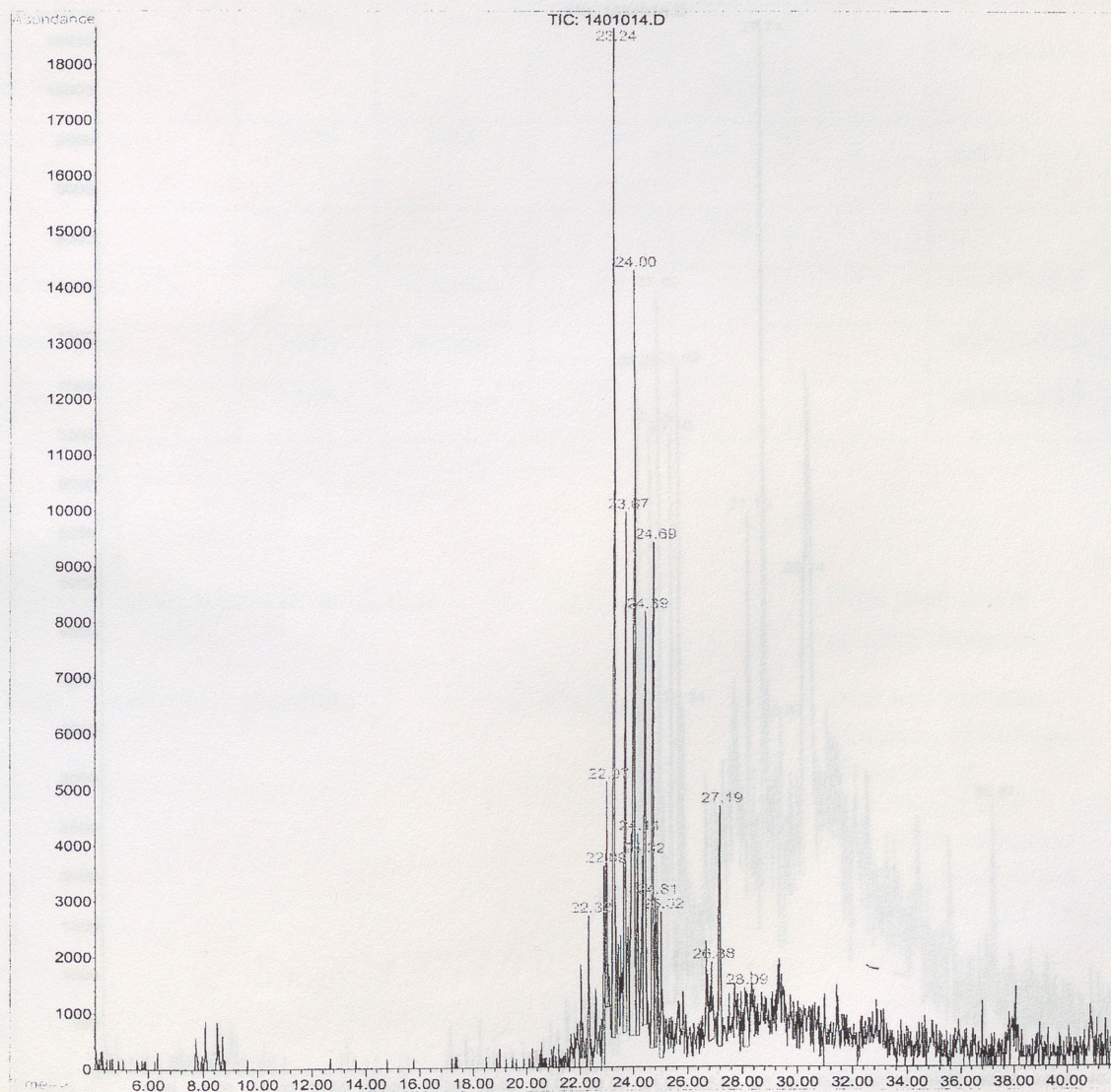
R.T. 27.74

1. 1-Hexacosanol	$C_{26}H_{54}O$	derived from natural fats and oils (noted 3v)
2. 1-Eicosanol	$C_{20}H_{42}O$	derived from natural fats and oils (noted 3v)
3. Silane, Trichloroeicosyl	no data	no data

Graph XVII 9f (Sample #9)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\1401014.D Vial: 14
Acq On : 11 Apr 2007 3:34 am Operator: Herb Nance
Sample : 9F Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



1401014.D ESSOILHS.M Fri Apr 20 18:04:03 2007 GC/MS

Graph XVIII 9v (Sample #9)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\1501015.D

Acq On : 11 Apr 2007 4:20 am

Sample : 9V

Misc :

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

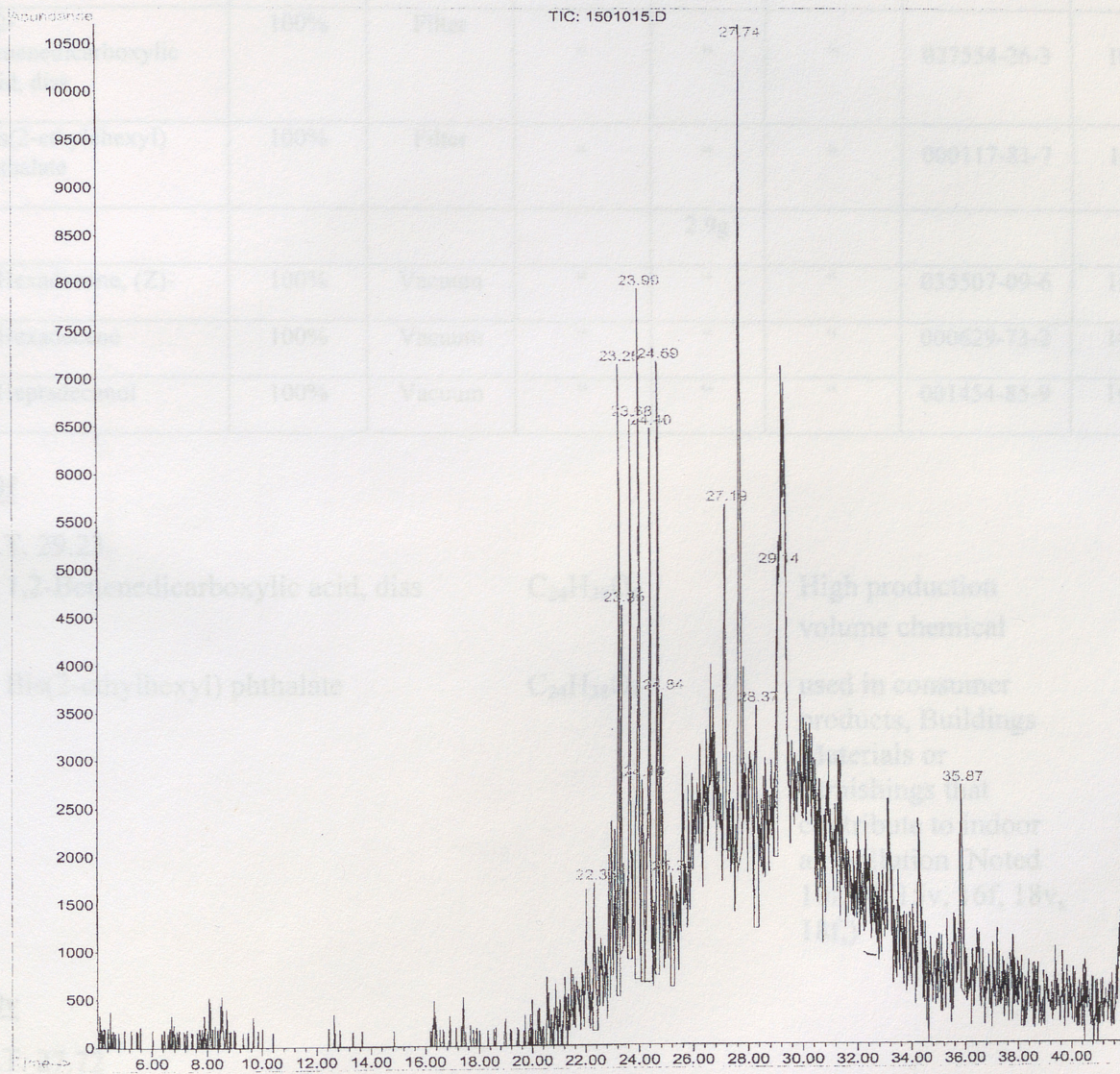
Title : Volatiles

Vial: 15

Operator: Herb Nance

Inst : GC/MS Ins

Multiplr: 1.00



1501015.D ESSOILHS.M Fri Apr 20 18:04:31 2007 GC/MS

Table 10

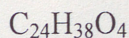
Zip Code Unknown (Sample #10)

	corr % max	Indoor Source	Zip Code Not published	WT 5.4g	Condition Not published	cas#	Sample #10
1,2-Benenedicarboxylic acid, diss	100%	Filter	“	“	“	027554-26-3	10f
Bis(2-ethylehexyl) phthalate	100%	Filter	“	“	“	000117-81-7	10f
				2.9g			
7-Hexadecene, (Z)-	100%	Vacuum	“	“	“	035507-09-6	10v
1-Hexadecene	100%	Vacuum	“	“	“	000629-73-2	10v
1-Heptadecanol	100%	Vacuum	“	“	“	001454-85-9	10v

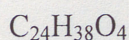
10f

R.T. 29.23

1. 1,2-Benenedicarboxylic acid, diss

High production
volume chemical

2. Bis(2-ethylhexyl) phthalate

used in consumer
products, Buildings
Materials or
furnishings that
contribute to indoor
air pollution (Noted
10f, 6f, 15v, 16f, 18v,
18f.)**10v**

R.T. 27.72

1. 7-Hexadecene, (Z)-

functional drilling
fluid, metal working
fluid

2. 1-Hexadecene

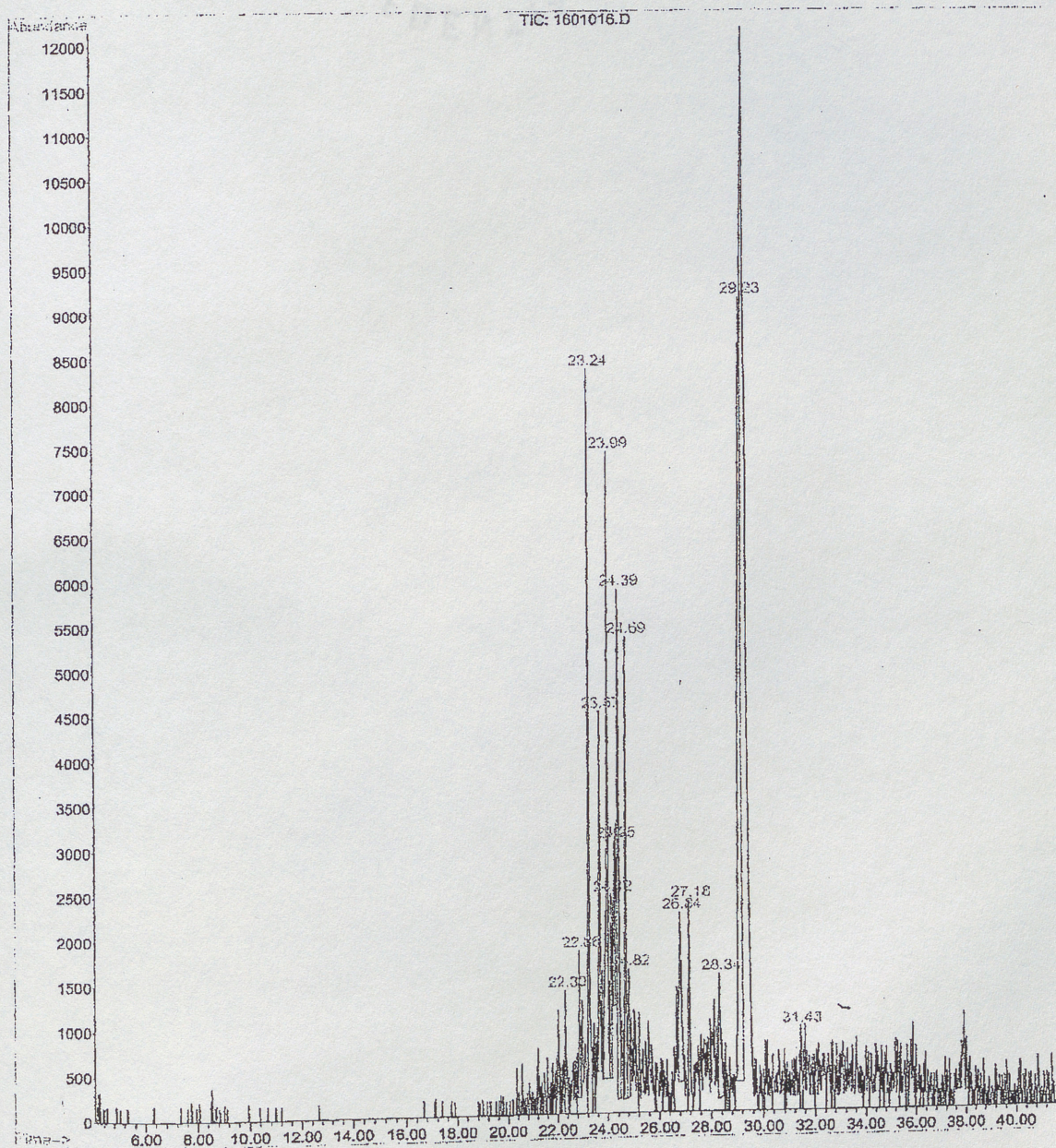


functional drilling

Graph XIX
10f (Sample #10)

Area Percent Report

File : C:\HPCHEM\1\DATA\041007\1601016.D Vial: 16
Acq On : 11 Apr 2007 5:07 am Operator: Herb Nance
Sample : 10F Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



1601016.D ESSOILHS.M Fri Apr 20 18:06:45 2007 GC/MS

Graph XX

10v (Sample #10)

Zip Code 76031 (Sample #11)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041007\1701017.D

Acq On : 11 Apr 2007 5:54 am

Sample : 10V

Misc :

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

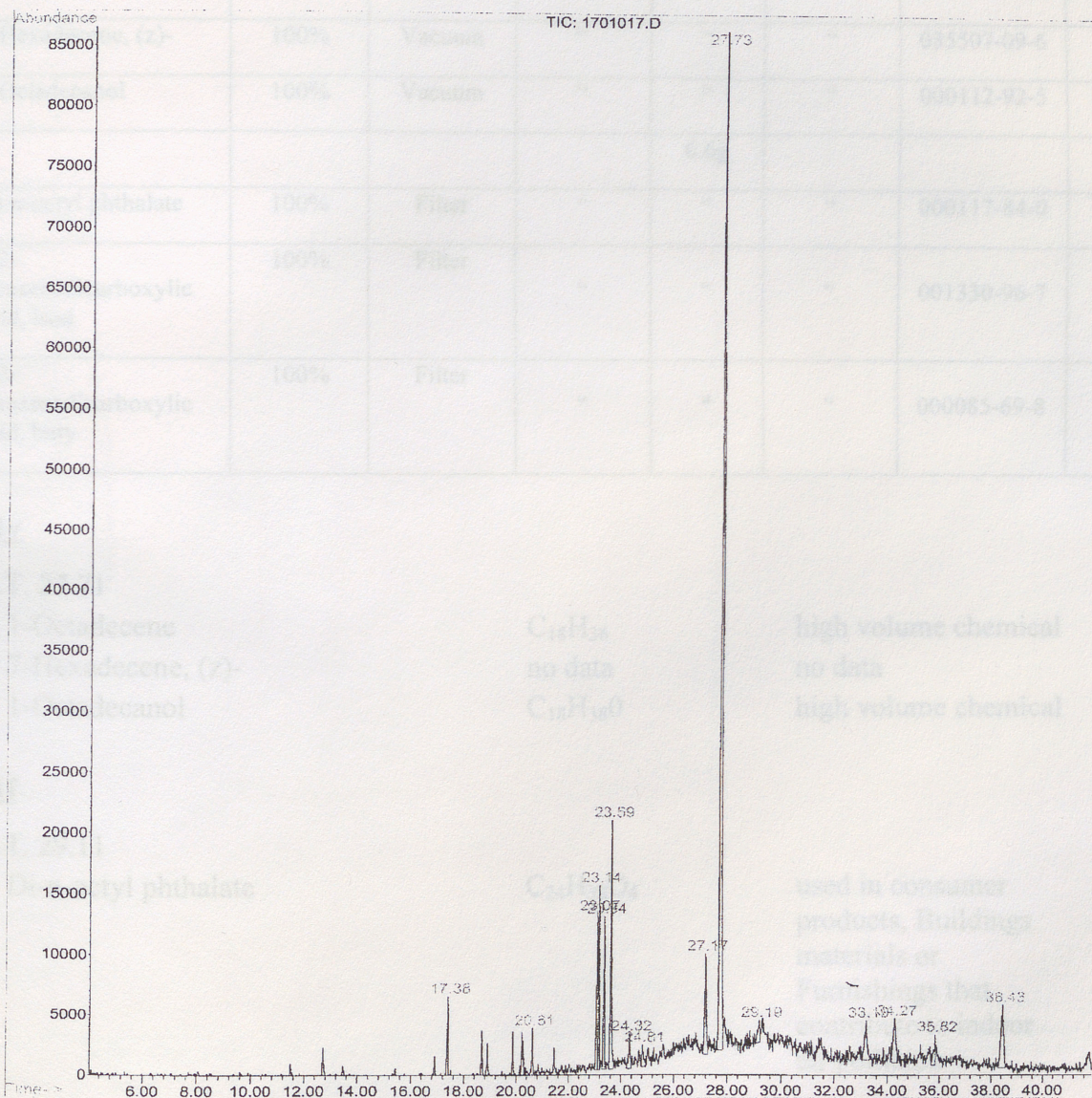
Title : Volatiles

Vial: 17

Operator: Herb Nance

Inst : GC/MS Ins

Multiplr: 1.00



1701017.D ESSOILHS.M Fri Apr 20 18:07:02 2007 GC/MS

Table 11

Zip Code 77031 (Sample #11)

	corr % max	Indoor Source	Zip Code 77031	WT 5.2g	Condition none	cas#	Sample #11
1-Octadecene	100%	Vacuum	"	"	"	000112-88-9	11v
7-Hexadecene, (z)-	100%	Vacuum	"	"	"	035507-09-6	11v
1-Octadecanol	100%	Vacuum	"	"	"	000112-92-5	11v
				6.6g			
Di-n-octyl phthalate	100%	Filter	"	"	"	000117-84-0	11f
1,2-Benzenedicarboxylic acid, isod	100%	Filter	"	"	"	001330-96-7	11f
1,2-Benzenedicarboxylic acid, buty	100%	Filter	"	"	"	000085-69-8	11f

11v

R.T. 27.71

1. 1-Octadecene

 $C_{18}H_{36}$

high volume chemical

2. 7-Hexadecene, (z)-

no data

no data

3. 1-Octadecanol

 $C_{18}H_{38}O$

high volume chemical

11f

R.T. 29.11

1. Di-n-octyl phthalate

 $C_{24}H_{38}O_4$

used in consumer products, Buildings materials or Furnishings that contribute to indoor air pollution

2. 1,2-Benzenedicarboxylic acid, isod

no data

no data

3. 1,2-Benzenedicarboxylic acid, buty

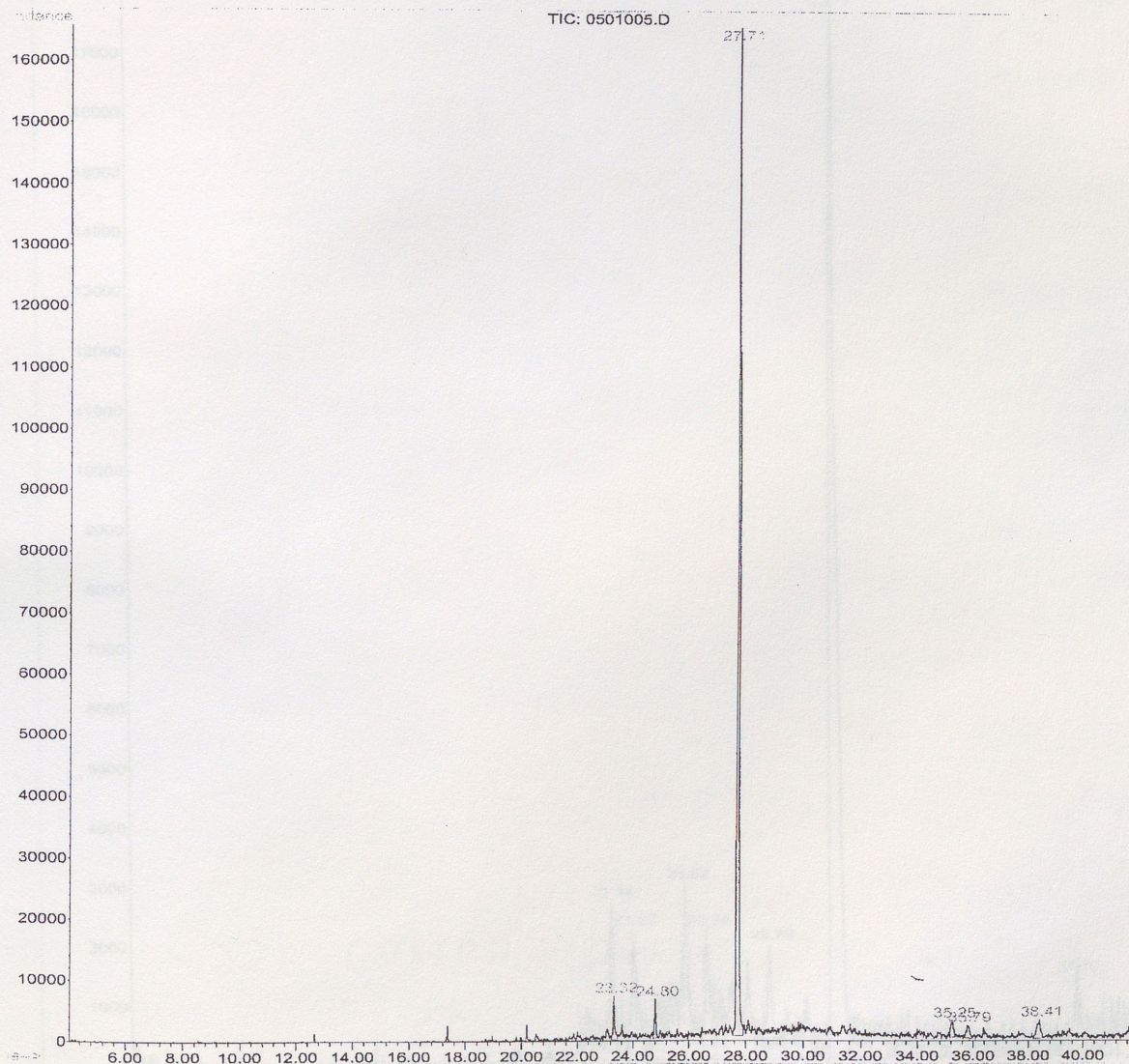
 $C_{20}H_{30}O_4$

softeners – plasticizers-phthalates (noted 12v)

Graph XXI
11v (Sample #11)

Area Percent Report

File : C:\HPCHEM\1\DATA\041107\0501005.D Vial: 5
Acq On : 11 Apr 2007 9:09 pm Operator: Herb Nance
Sample : 11V Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles

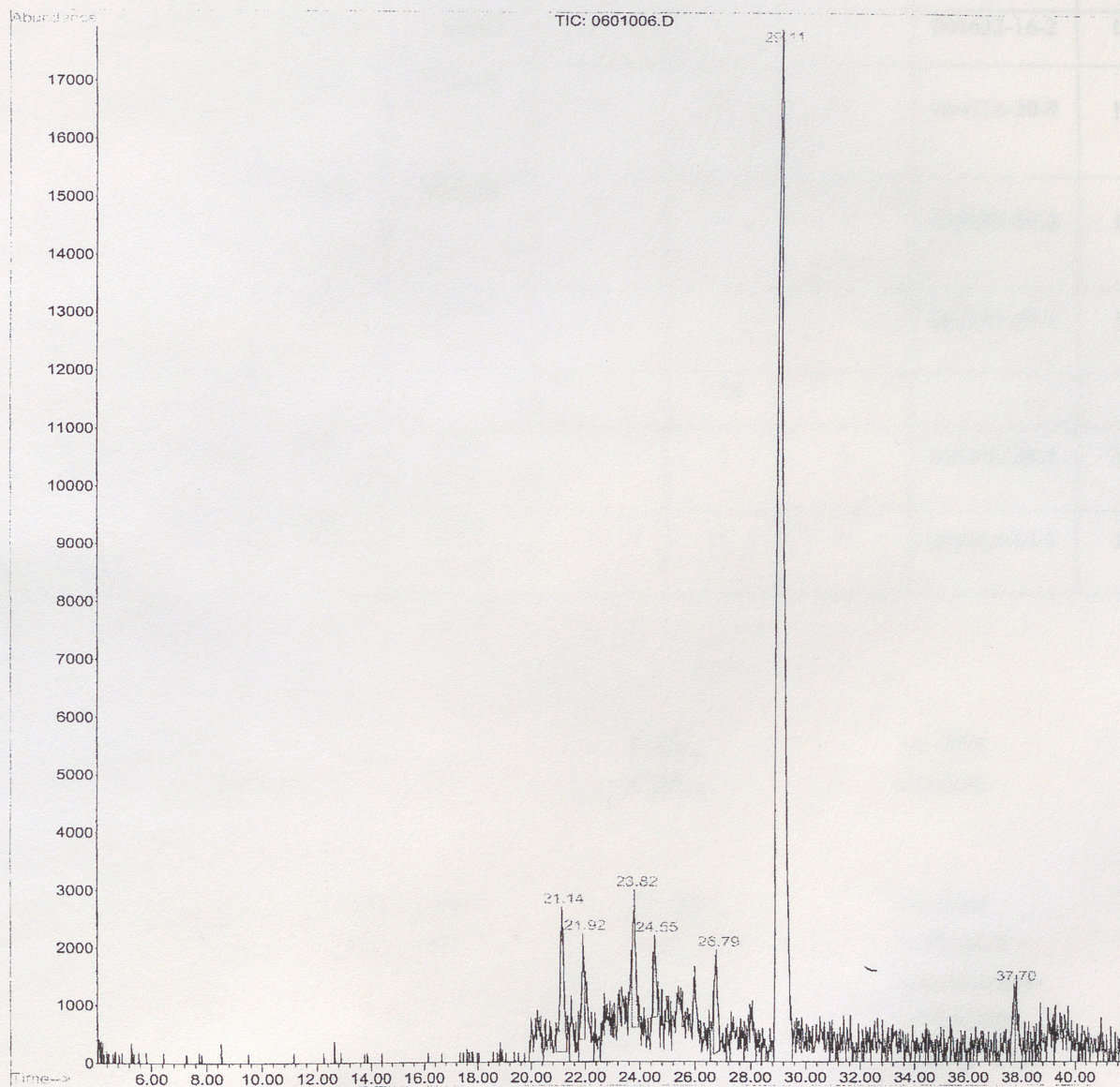


501005.D ESSOILHS.M Fri Apr 20 18:15:59 2007 GC/MS

Graph XXII
11f (Sample #11)

Area Percent Report

File : C:\HPCHEM\1\DATA\041107\0601006.D Vial: 6
On : 11 Apr 2007 9:56 pm Operator: Herb Nance
Sample : 11F Inst : GC/MS Ins
Disc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volitiles



0601006.D ESSOILHS.M Fri Apr 20 18:17:22 2007 GC/MS

Table 12

Zip Code 77071 (Sample #12)

	corr % max	Indoor Source	Zip Code 77071	WT 7.3g	Condition bronchitis	cas#	Sample #12
2-Octene, (E)-	81.10%	Vacuum	"	"	"	013389-42-9	12v
Heptane, 3-methylene-	81.10%	Vacuum	"	"	"	001632-16-2	12v
1,2-Benzenedicarboxylic acid, mono	100%	Vacuum	"	"	"	004376-20-9	12v
1,2-Benzenedicarboxylic acid, buty	100%	Vacuum	"	"	"	000085-69-8	12v
Nonane, 4-methyl-5- propyl	100%	Vacuum	"	"	"	062185-55-1	12v
				7.2g			
2,6,10- Dodectrien-1- 01, 3,7,11-tr	100%	Filter	"	"	"	000106-28-5	12f
2,6,10- Dodectrien-1- 01, 3,7,11-tr	100%	Filter	"	"	"	004602-84-0	12f

12v

R.T. 34.95

1. 2-Octene, (E)-

 C_8H_{16}

no data

2. Heptane, 3-methylene-

 C_8H_{16}

no data

R.T. 35.21

1. 1,2-Benzenedicarboxylic acid, mono

no data

no data

2. 1,2-Benzenedicarboxylic acid, buty

 $C_{20}H_{30}O_4$ softeners –
plasticizers-
phthalates
(noted 11f)

3. Nonane, 4-methyl-5-propyl

no data

no data

12f

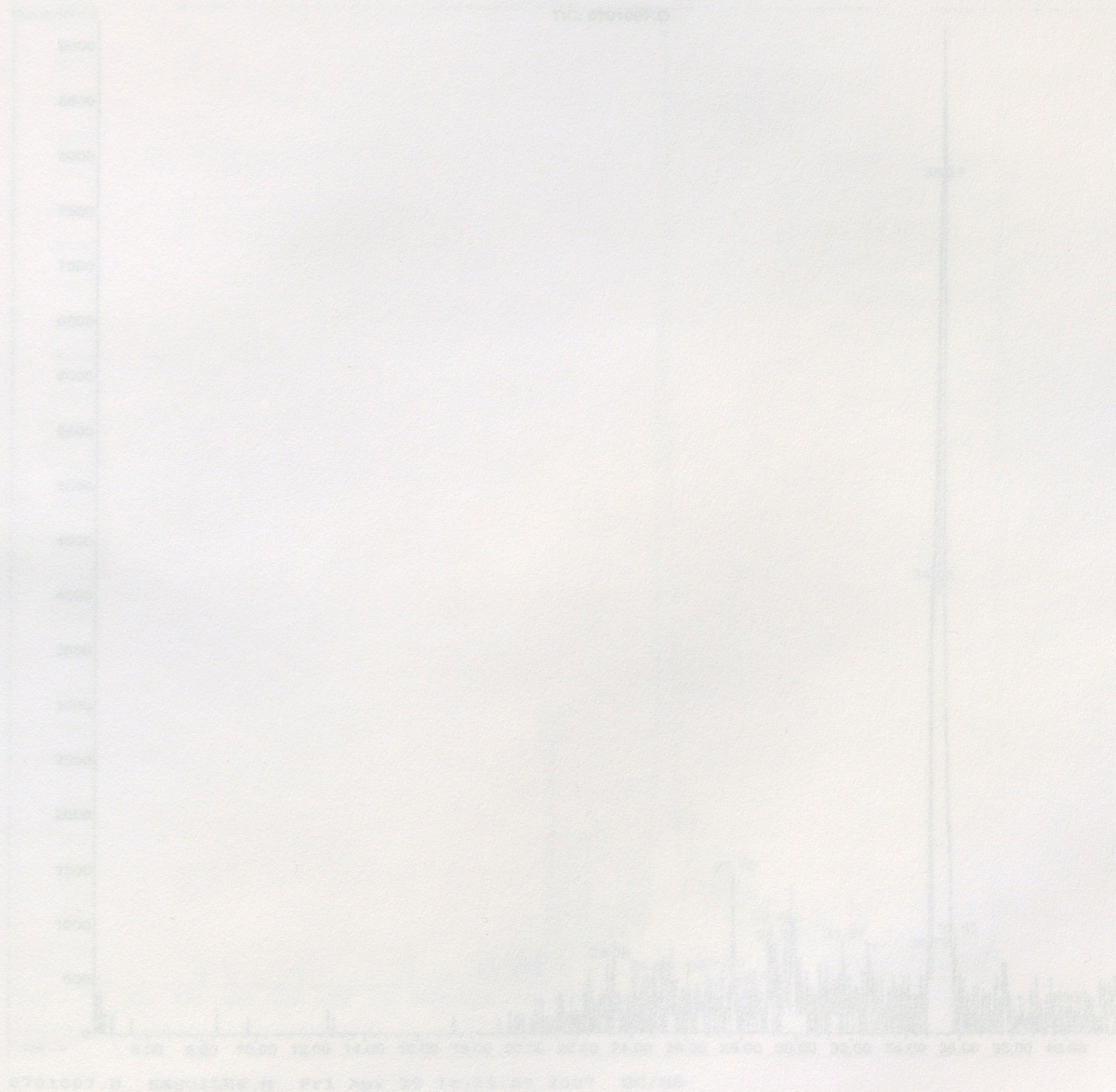
R.T. 28.11

1. 2,6,10- Dodectrien-1-01, 3,7,11-tr

 $C_{12}H_{26}O$ used in
Pesticide
productsGraph XXIII
12v (Sample #12)

Area Percent Report

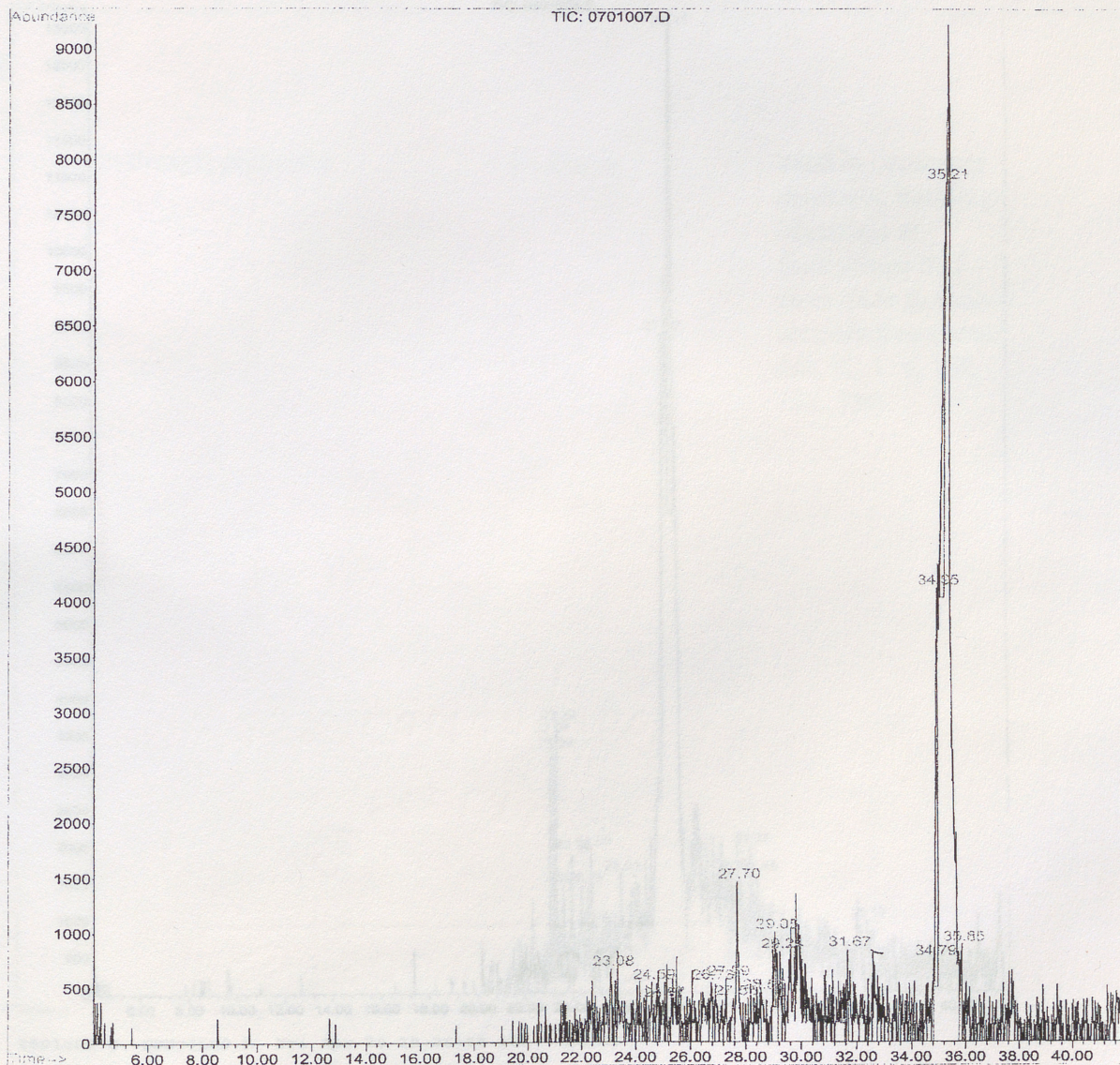
Data File : C:\HPCHEM\1\DATA\00110716701001.D Vial: 7
Acq On : 11 Apr 2007 10:41 pm Operator: Mark Hance
Sample : 12V Inst : GC/MS Int
N100 : Multiplier: 1.00
MS Integration Param: P2117.D
Method : C:\HPCHEM\1\METHODS\MSDCHEM.M (MS Integration)
Title : Volatiles



Graph XXIII
12v (Sample #12)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\0701007.D Vial: 7
Acq On : 11 Apr 2007 10:43 pm Operator: Herb Nance
Sample : 12V Inst : GC/MS Ins
Misc : Multipl: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



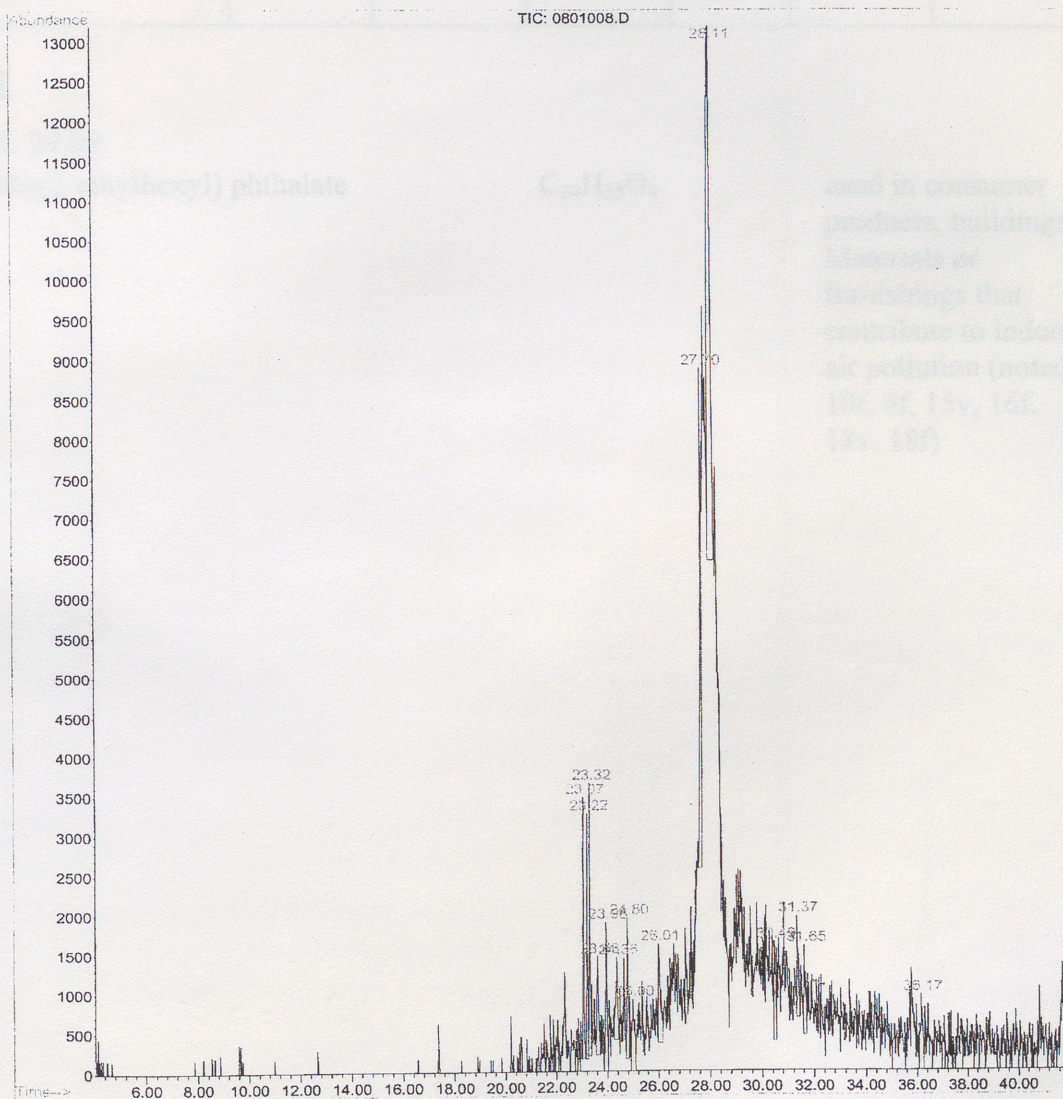
0701007.D ESSOILHS.M Fri Apr 20 18:25:57 2007 GC/MS

Graph XXIV

12f (Sample #12)

Area Percent Report

a File : C:\HPCHEM\1\DATA\041107\0801008.D Vial: 8
q On : 11 Apr 2007 11:30 pm Operator: Herb Nance
ample : 12F Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



0801008.D ESSOILHS.M Fri Apr 20 18:26:55 2007 GC/MS

Table 13

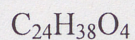
Zip Code 77498 (Sample #13)

	corr % max	Indoor Source	Zip Code	WT	Condition	cas#	Sample #13
Bis(2-ethylhexyl) phthalate	100%	Filter	77498	4.8g	none	000117-81-7	13f

13f

R.T. 29.09

1. Bis(2-ethylhexyl) phthalate



used in consumer
products, buildings
Materials or
furnishings that
contribute to indoor
air pollution (noted
10f, 6f, 15v, 16f,
18v, 18f)

Graph XXV
13f (Sample #13)

Zip Code 77072 (Sample #14)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\0901009.D

Acq On : 12 Apr 2007 12:16 am

Sample : 13F

Misc :

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

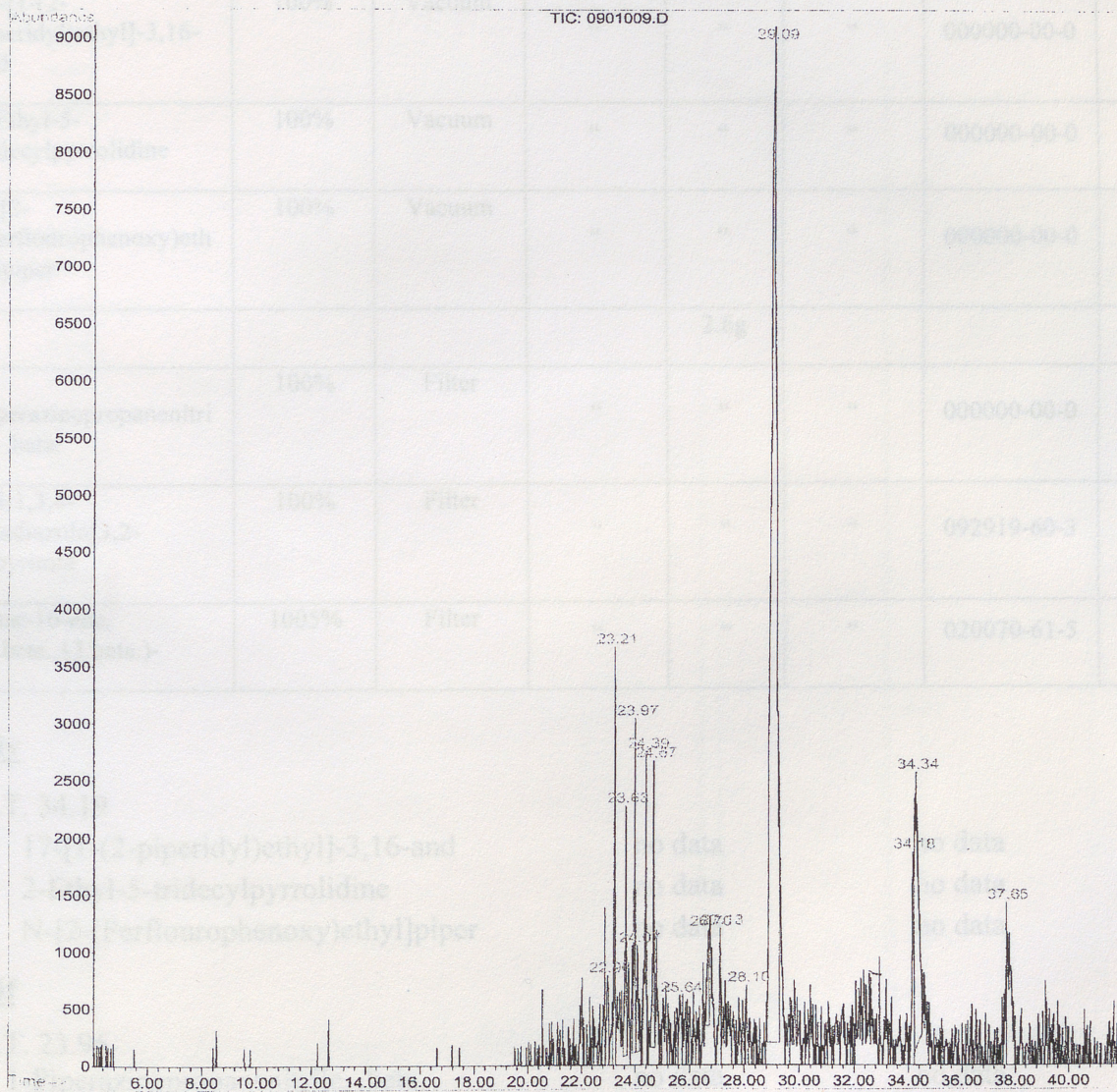
Title : Volatiles

Vial: 9

Operator: Herb Nance

Inst : GC/MS Ins

Multiplr: 1.00



0901009.D ESSOILHS.M Fri Apr 20 18:28:03 2007 GC/MS

Table 14

Zip Code 77072 (Sample #14)

	corr % max	Indoor Source	Zip Code 77072	WT 1.5g	Condition none	cas#	Sample #14
17-[1-(2-piperidyl)ethyl]-3,16-and	100%	Vacuum	"	"	"	000000-00-0	14v
2-Ethyl-5-tridecylpyrrolidine	100%	Vacuum	"	"	"	000000-00-0	14v
N-[2-(Perflourophenoxy)ethyl]piper	100%	Vacuum	"	"	"	000000-00-0	14v
				2.6g			
1-Piperazinepropanenitrile, .beta.	100%	Filter	"	"	"	000000-00-0	14f
5H-1,3,4-thiadiazolo[3,2-a]pyrimid	100%	Filter	"	"	"	092919-60-3	14f
Kaur-16-ene, (8.beta.,13.beta.)-	1005%	Filter	"	"	"	020070-61-5	14f

14v

R.T. 34.19

- | | | |
|---------------------------------------|---------|---------|
| 1. 17-[1-(2-piperidyl)ethyl]-3,16-and | no data | no data |
| 2. 2-Ethyl-5-tridecylpyrrolidine | no data | no data |
| 3. N-[2-(Perflourophenoxy)ethyl]piper | no data | no data |

14f

R.T. 23.96

- | | | |
|---------------------------------------|---------|---------|
| 1. 1-Piperazinepropanenitrile, .beta. | no data | no data |
| 2. 5H-1,3,4-thiadiazolo[3,2-a]pyrimid | no data | no data |
| 3. Kaur-16-ene, (8.beta.,13.beta.)- | no data | no data |

Graph XXVI

14v (Sample #14)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\1001010.D

Vial: 10

Acq On : 12 Apr 2007 1:03 am

Operator: Herb Nance

Sample : 14V

Inst : GC/MS Ins

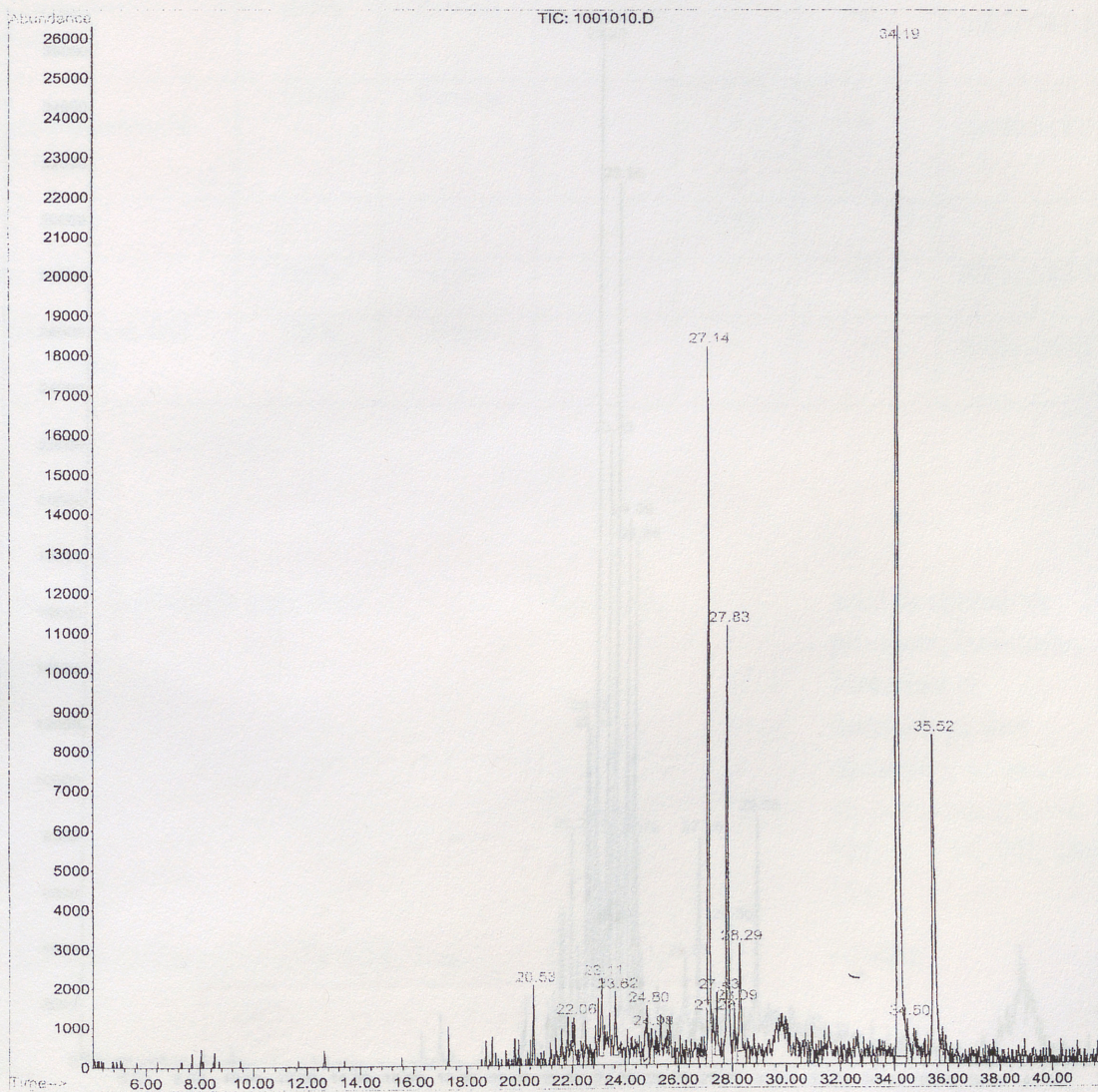
Misc :

Multiplr: 1.00

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

Title : Volatiles



1001010.D ESSOILHS.M Fri Apr 20 18:30:28 2007 GC/MS

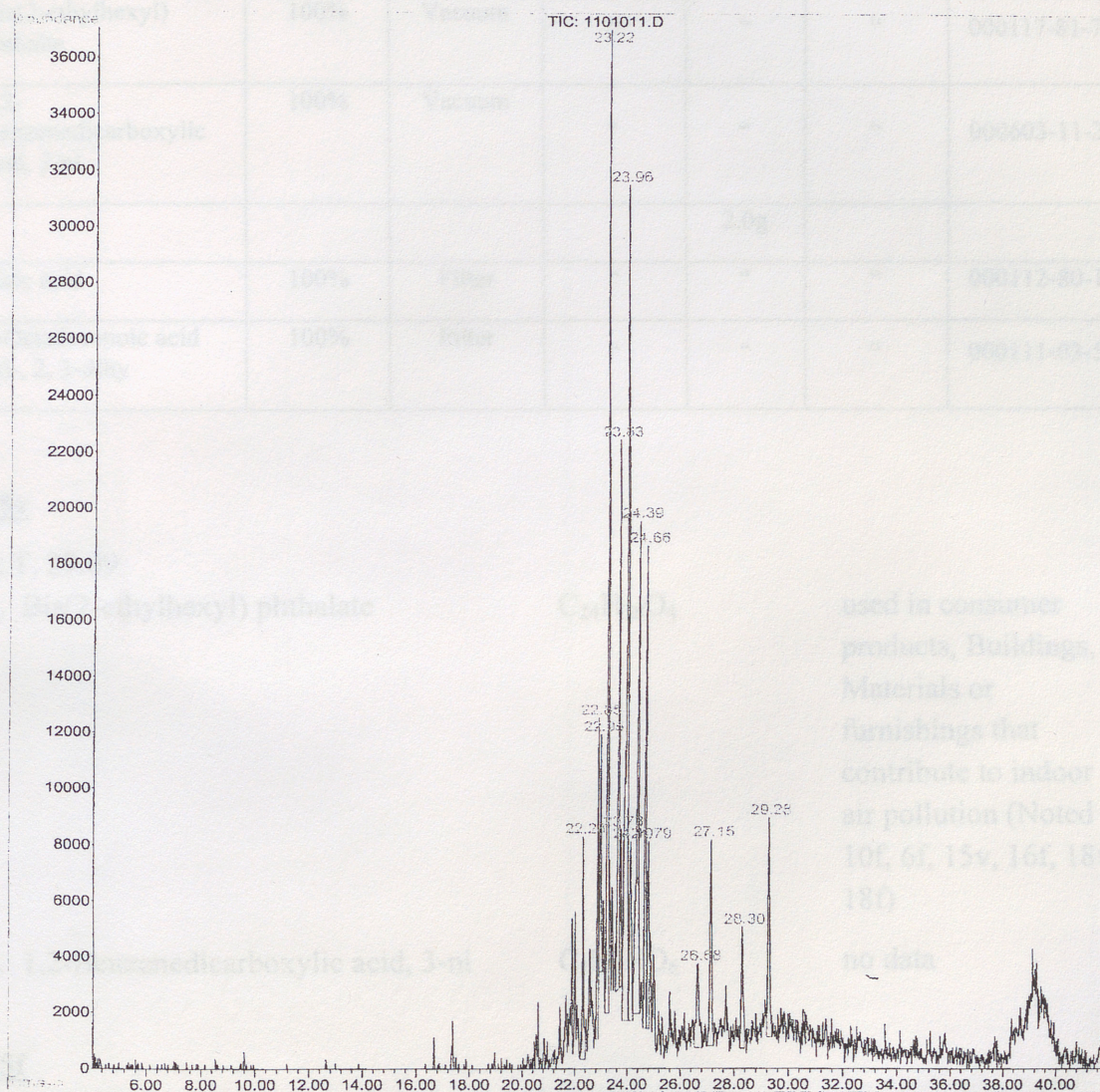
Graph XXVII

14f (Sample #14)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\1101011.D
 Acq On : 12 Apr 2007 1:50 am
 Sample : 14F
 Misc :
 MS Integration Params: RTEINT.P
 Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
 Title : Volatiles

Vial: 11
 Operator: Herb Nance
 Inst : GC/MS Ins
 Multiplr: 1.00



1101011.D ESSOILHS.M Fri Apr 20 18:31:02 2007 GC/MS

Table 15

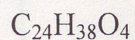
Zip Code 77045 (Sample #15)

	corr % max	Indoor Source	Zip Code 77045	WT 6.2g	Condition none	cas#	Sample #15
Bis(2-ethylhexyl) phthalate	100%	Vacuum	“	“	“	000117-81-7	15v
1,2- Benzenedicarboxylic acid, 3-ni	100%	Vacuum	“	“	“	000603-11-2	15v
				2.0g			
oleic acid	100%	Filter	“	“	“	000112-80-1	15f
9-Octadecenoic acid (z)-, 2, 3-dihy	100%	Filter	“	“	“	000111-03-5	15f

15v

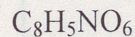
R.T. 29.09

1. Bis(2-ethylhexyl) phthalate



used in consumer products, Buildings, Materials or furnishings that contribute to indoor air pollution (Noted 10f, 6f, 15v, 16f, 18v, 18f)

2. 1,2-Benzenedicarboxylic acid, 3-ni

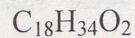


no data

15f

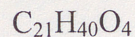
R.T. 29.38

1. oleic acid



high volume chemical

2. 9-Octadecenoic acid (z)-, 2, 3-dihy



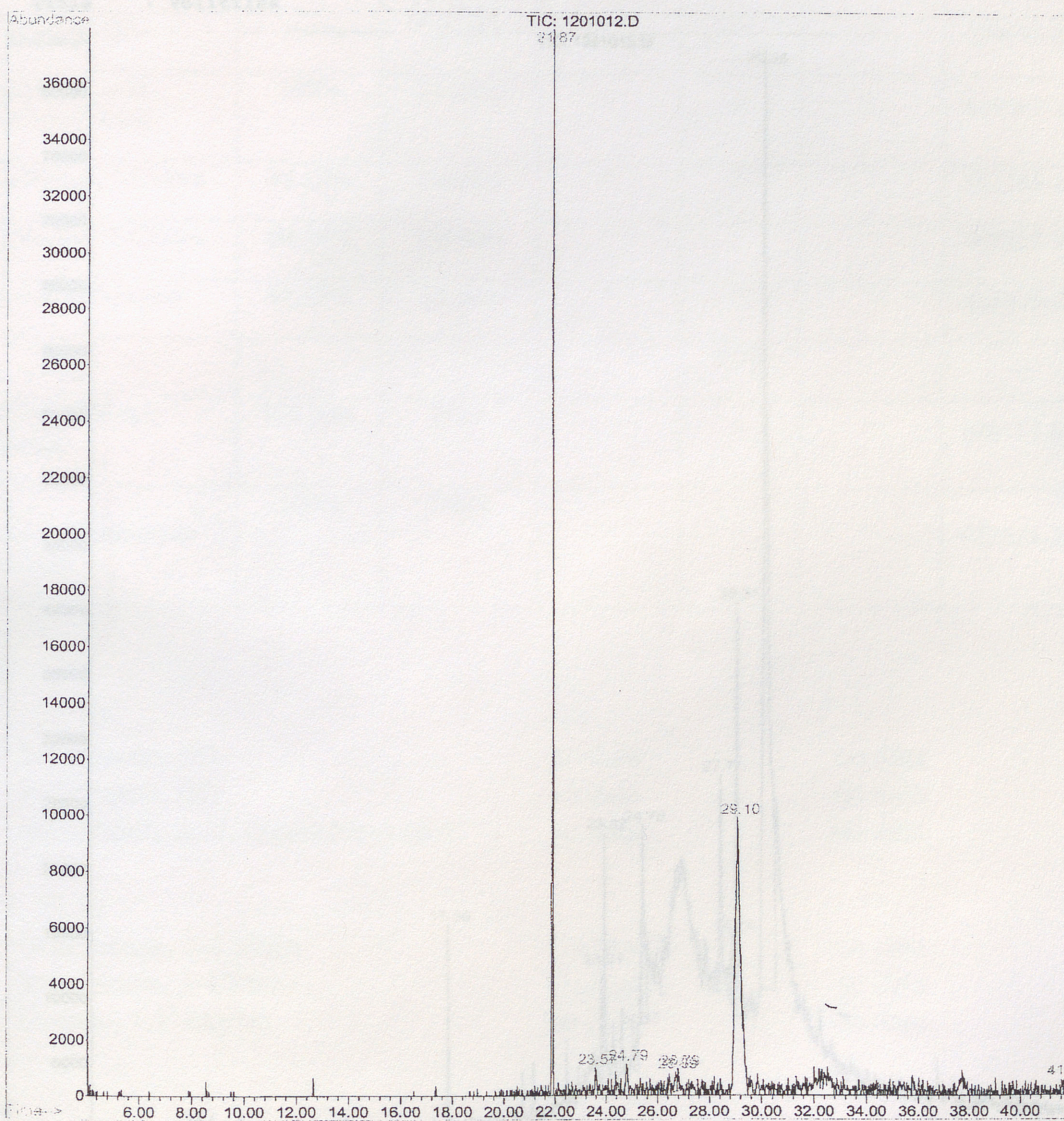
no data

Graph XXVIII

15v (Sample #15)

Area Percent Report

ca File : C:\HPCHEM\1\DATA\041107\1201012.D Vial: 12
cq On : 12 Apr 2007 2:36 am Operator: Herb Nance
Sample : 15V Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



1201012.D ESSOILHS.M Fri Apr 20 18:32:21 2007 GC/MS

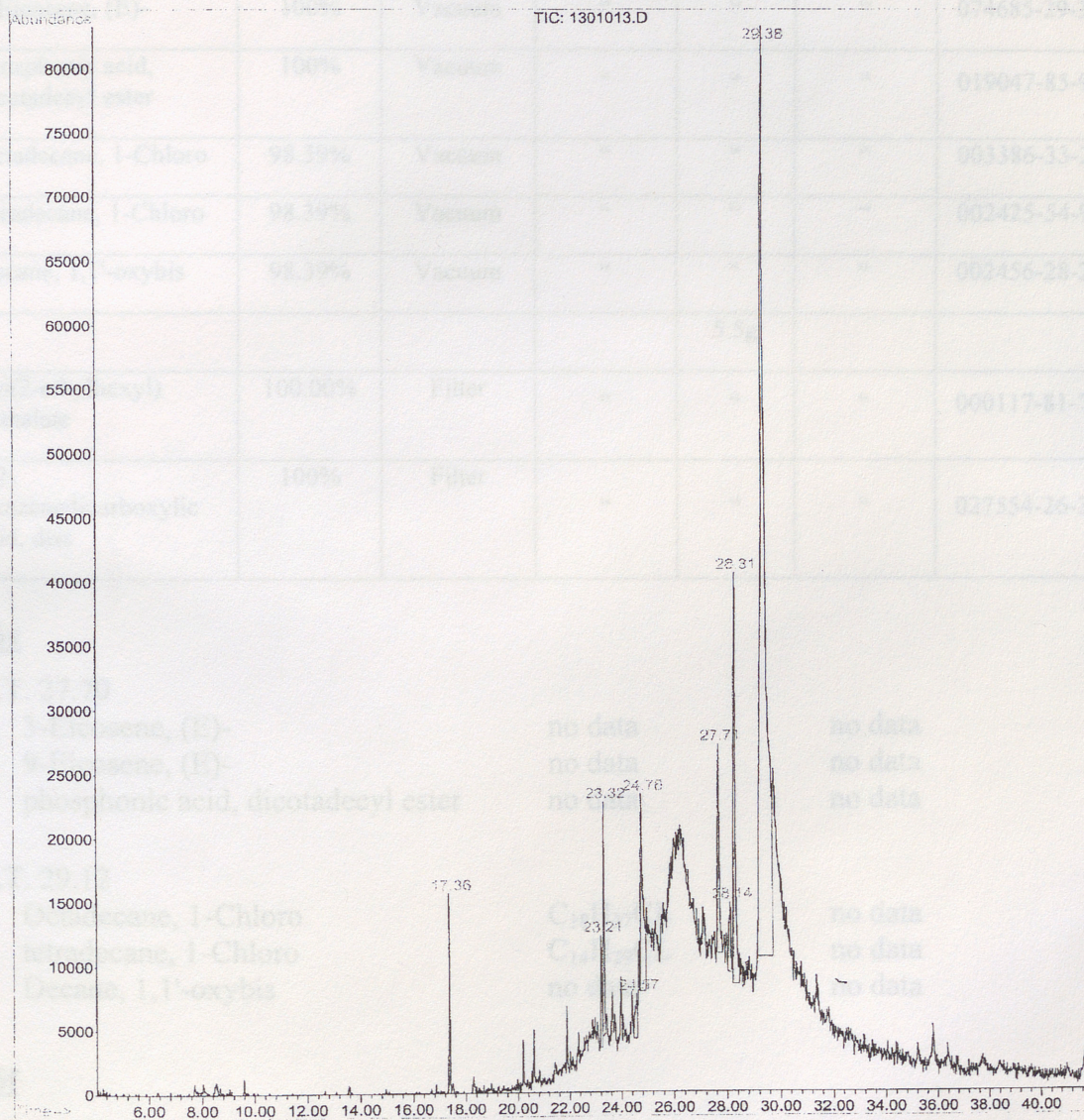
Graph XXIX

15f (Sample #15)

Zip Code Unknown (Sample #16)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\1301013.D Vial: 13
 Acq On : 12 Apr 2007 3:23 am Operator: Herb Nance
 Sample : 15F Inst : GC/MS Ins
 Misc : Multiplr: 1.00
 MS Integration Params: RTEINT.P
 Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
 Title : Volatiles



1301013.D ESSOILHS.M Fri Apr 20 18:33:53 2007 GC/MS

used in consumer
products, Buildings
Materials or
furnishings that
contribute to indoor

Table 16

Zip Code Unknown (Sample #16)

	corr % max	Indoor Source	Zip Code unknown	WT 6.9g	Condition none	cas#	Sample #16
3-Eicosene, (E)-	100%	Vacuum	“	“	“	074685-33-9	16v
9-Eicosene, (E)-	100%	Vacuum	“	“	“	074685-29-3	16v
phosphonic acid, dicotadecyl ester	100%	Vacuum	“	“	“	019047-85-9	16v
Octadecane, 1-Chloro	98.39%	Vacuum	“	“	“	003386-33-2	16v
tetradecane, 1-Chloro	98.39%	Vacuum	“	“	“	002425-54-9	16v
Decane, 1,1'-oxybis	98.39%	Vacuum	“	“	“	002456-28-2	16v
				5.5g			
Bis(2-ethylhexyl) phthalate	100.00%	Filter	“	“	“	000117-81-7	16f
1,2- Benzenedicarboxylic acid, diss	100%	Filter	“	“	“	027554-26-3	16f

16v

R.T. 27.70

1. 3-Eicosene, (E)-	no data	no data
2. 9-Eicosene, (E)-	no data	no data
3. phosphonic acid, dicotadecyl ester	no data	no data

R.T. 29.12

1. Octadecane, 1-Chloro	C ₁₈ H ₃₇ CL	no data
2. tetradecane, 1-Chloro	C ₁₄ H ₂₉ CL	no data
3. Decane, 1,1'-oxybis	no data	no data

16f

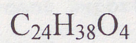
R.T. 29.11

1. Bis(2-ethylhexyl) phthalate	C ₂₄ H ₃₈ O ₄	used in consumer products, Buildings Materials or furnishings that contribute to indoor
--------------------------------	--	---

Graph XXX
16v (Sample #16)

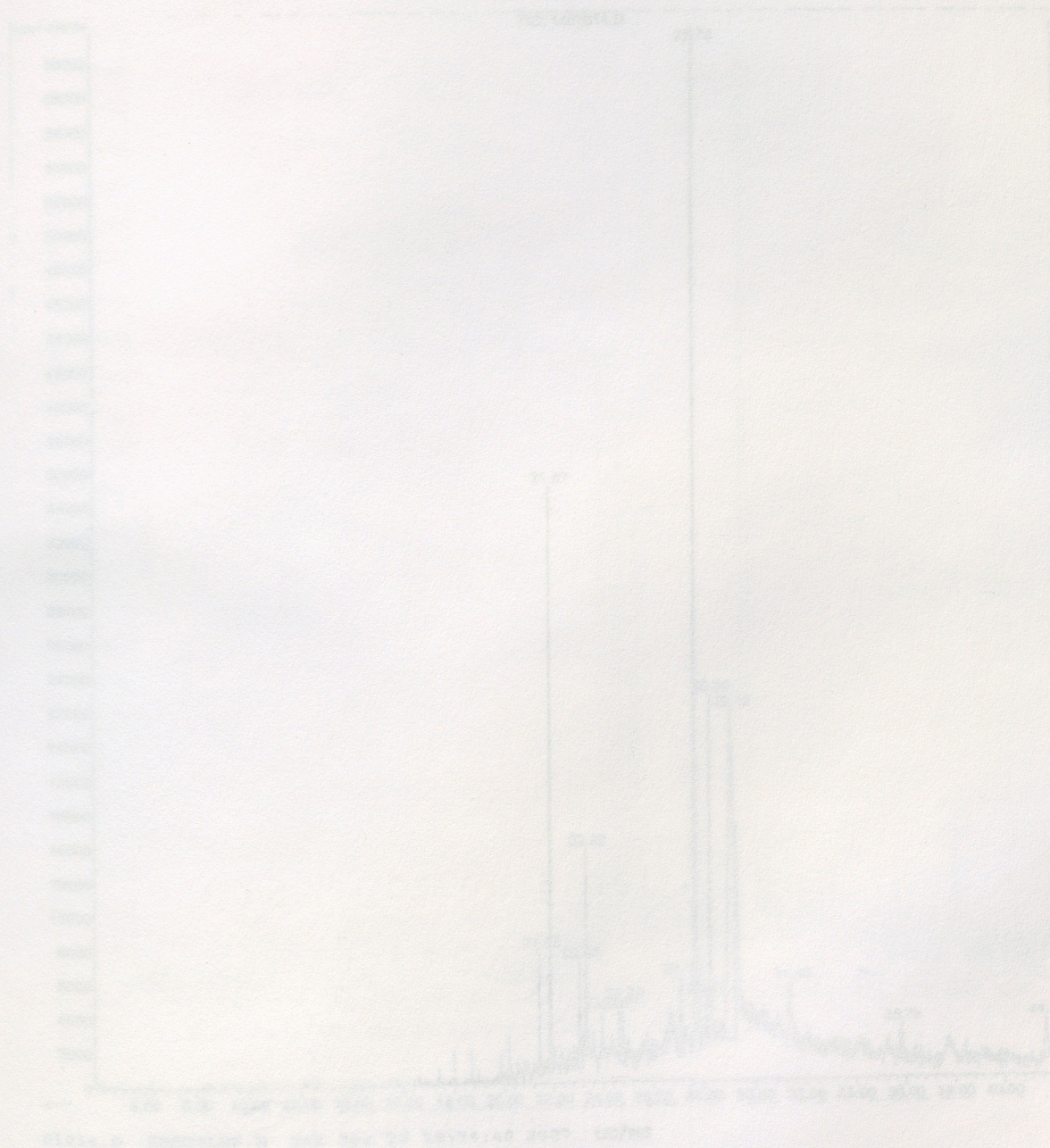
air pollution (noted
10f, 6f, 15v, 16f, 18v,
18f,)

2. 1,2-Benzenedicarboxylic acid, diss



high volume chemical

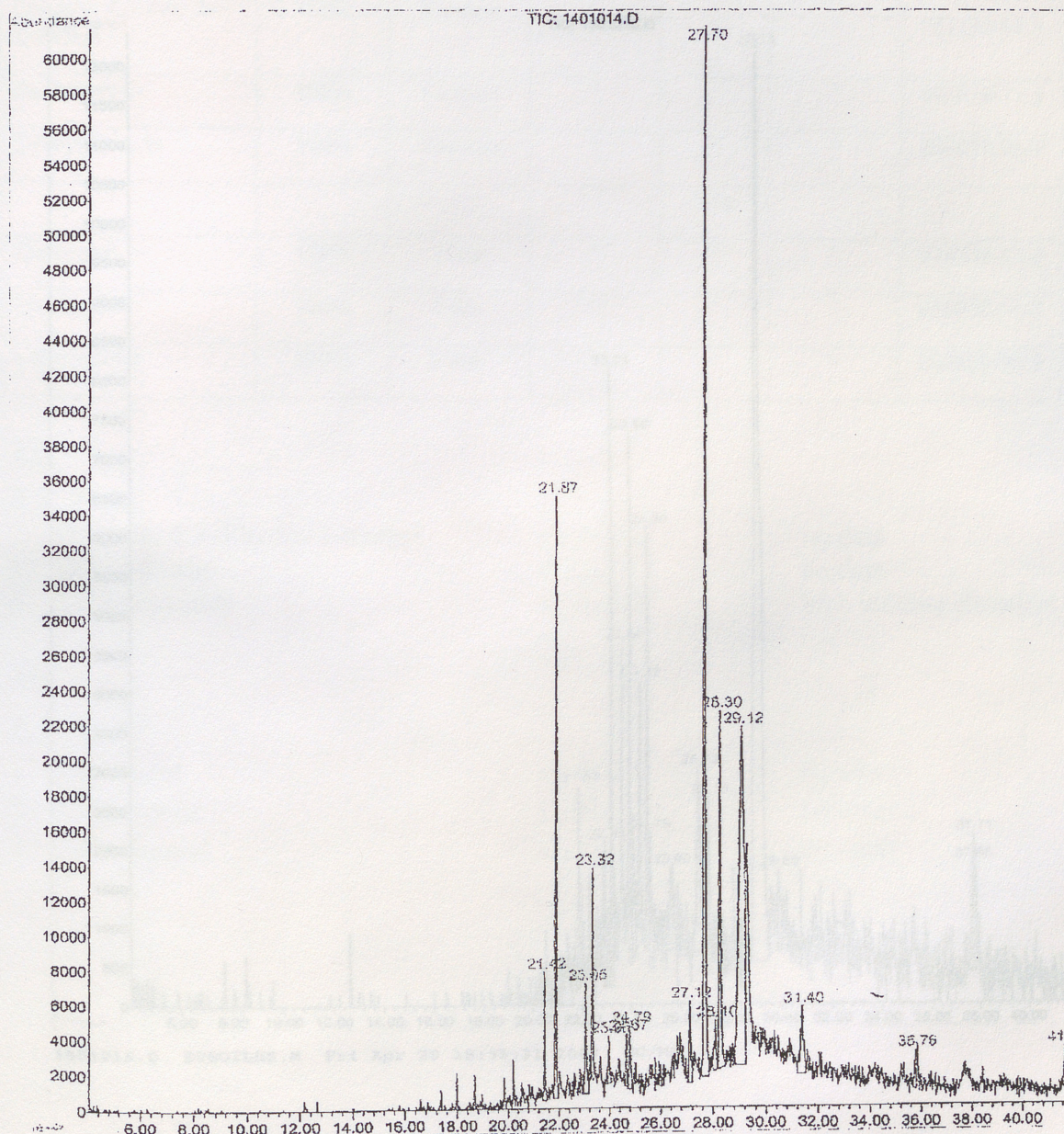
File Path : C:\MSDCHEM\1\DATA\16119\16119.D
Acq On : 12 Apr 2007 8:15 AM
Sample : 16V
Vial : 16
Integrator Param: KINET.F
Method : C:\MSDCHEM\1\METHODS\MSDCHEM.M (MSX Integrator)
Title : Volatiles
Vial : 16
Operator: Barb Nance
Inst : GC/MS KOD
Multiplier: 1.00



Graph XXX
16v (Sample #16)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\1401014.D Vial: 14
Acq On : 12 Apr 2007 4:10 am Operator: Herb Nance
Sample : 16V Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



01014.D ESSOILHS.M Fri Apr 20 18:34:40 2007 GC/MS

Graph XXXI 16f (Sample #16)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\1501015.D

Acq On : 12 Apr 2007 4:56 am

Sample : 16F

Misc :

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

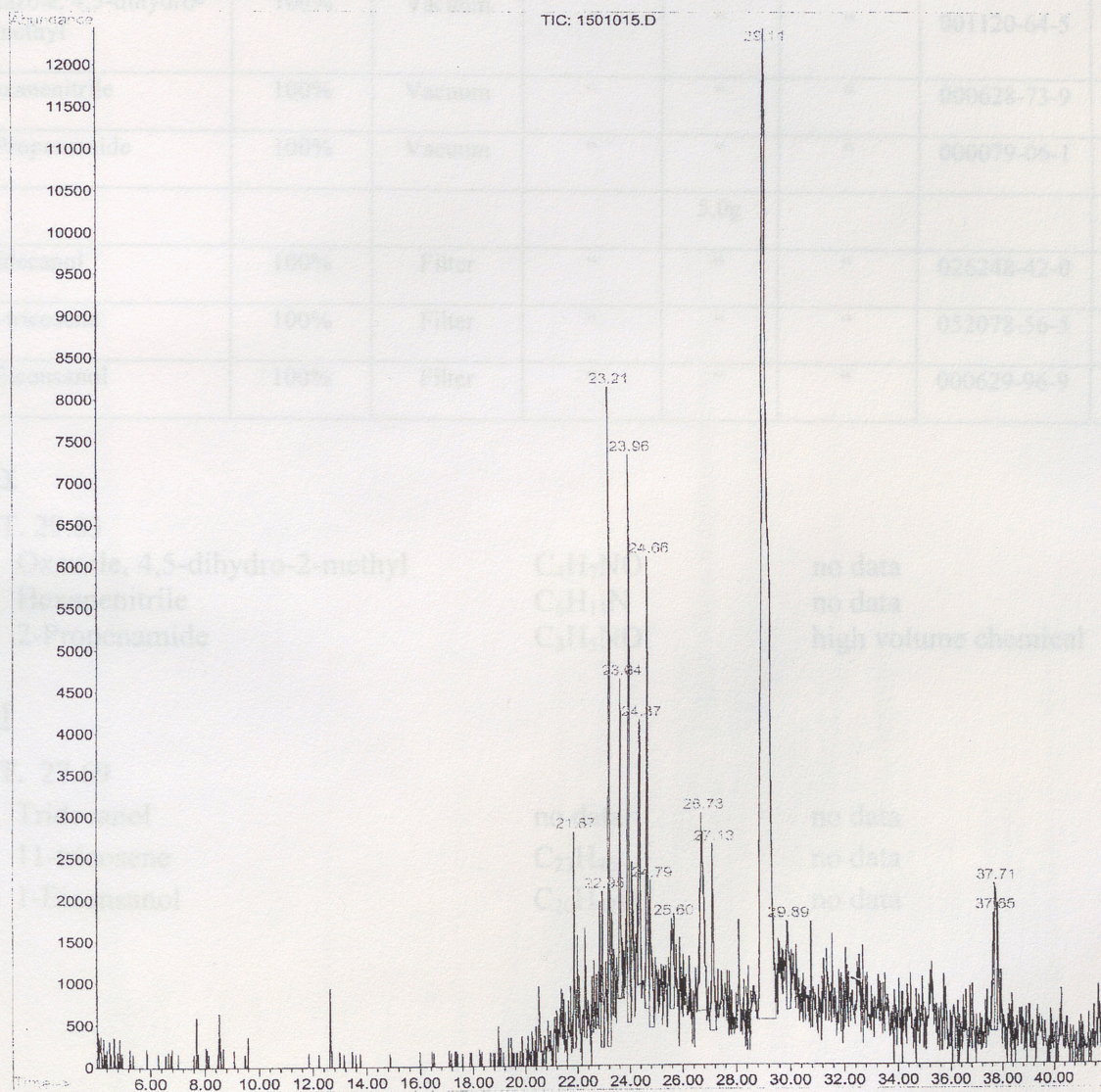
Title : Volatiles

Vial: 15

Operator: Herb Nance

Inst : GC/MS Ins

Multiplr: 1.00



1501015.D ESSOILHS.M Fri Apr 20 18:35:21 2007 GC/MS

Table 17

Zip Code 77083 (Sample #17)

	corr % max	Indoor Source	Zip Code 77083	WT 9.2g	Condition none	cas#	Sample #17
Oxazole, 4,5-dihydro-2-methyl	100%	Vacuum	“	“	“	001120-64-5	17v
Hexanenitrile	100%	Vacuum	“	“	“	000628-73-9	17v
2-Propenamide	100%	Vacuum	“	“	“	000079-06-1	17v
				5.0g			
Tridecanol	100%	Filter	“	“	“	026248-42-0	17f
11-tricosene	100%	Filter	“	“	“	052078-56-5	17f
1-Eiconsanol	100%	Filter	“	“	“	000629-96-9	17f

17v

R.T. 29.83

- | | | |
|----------------------------------|--------------|----------------------|
| 1. Oxazole, 4,5-dihydro-2-methyl | C_4H_7NO | no data |
| 2. Hexanenitrile | $C_6H_{11}N$ | no data |
| 3. 2-Propenamide | C_3H_5NO | high volume chemical |

17f

R.T. 27.69

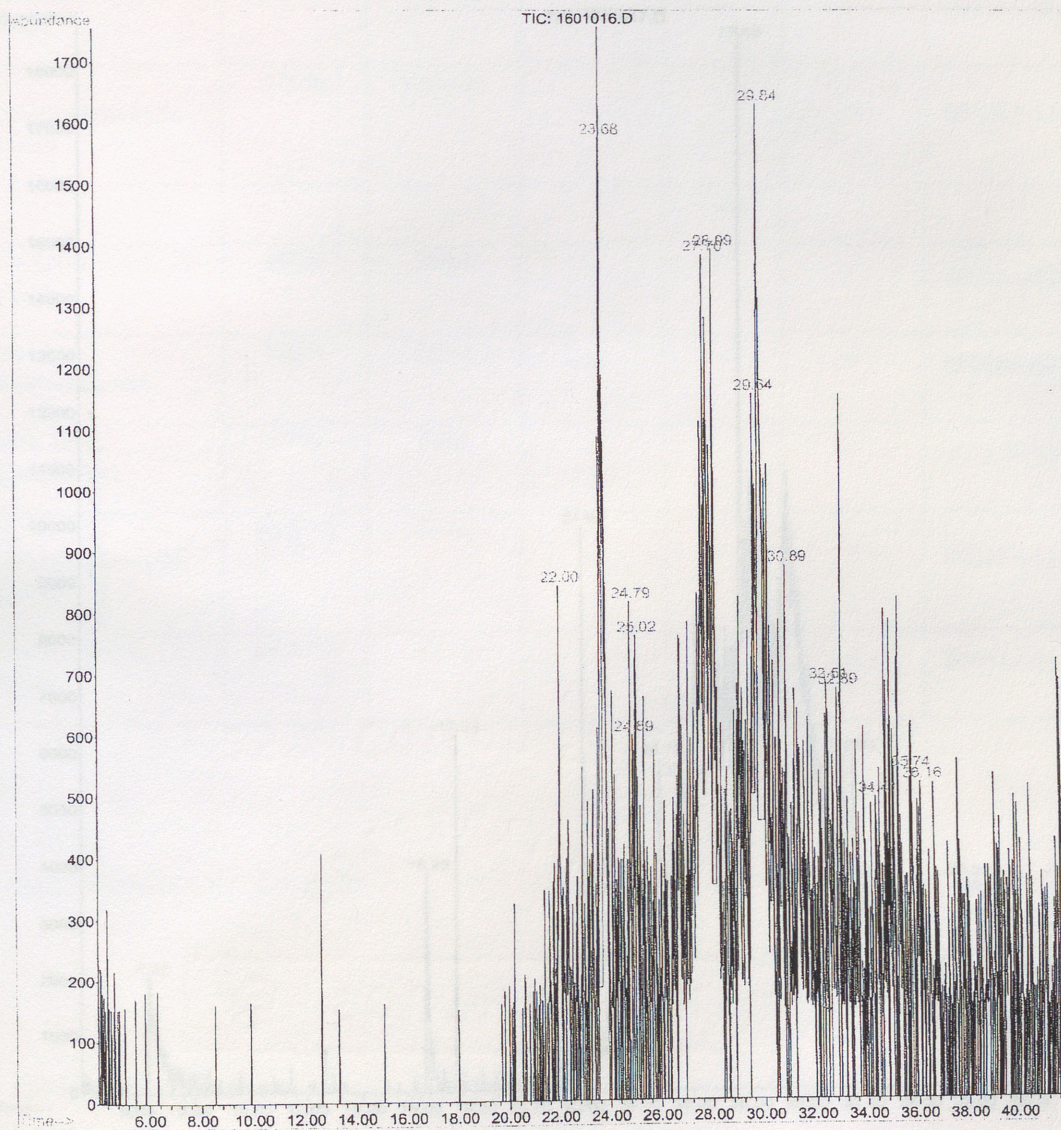
- | | | |
|-----------------|-----------------|---------|
| 1. Tridecanol | no data | no data |
| 2. 11-tricosene | $C_{23}H_{46}$ | no data |
| 3. 1-Eiconsanol | $C_{20}H_{42}O$ | no data |

Graph XXXII

17v (Sample #17)

Area Percent Report

File : C:\HPCHEM\1\DATA\041107\1601016.D Vial: 16
On : 12 Apr 2007 5:43 am Operator: Herb Nance
Sample : 17V Inst : GC/MS Ins
Scan : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



1601016.D ESSOILHS.M Fri Apr 20 18:35:53 2007 GC/MS

Graph XXXIII

17f (Sample #17)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\1701017.D

Acq On : 12 Apr 2007 6:29 am

Sample : 17F

Misc :

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

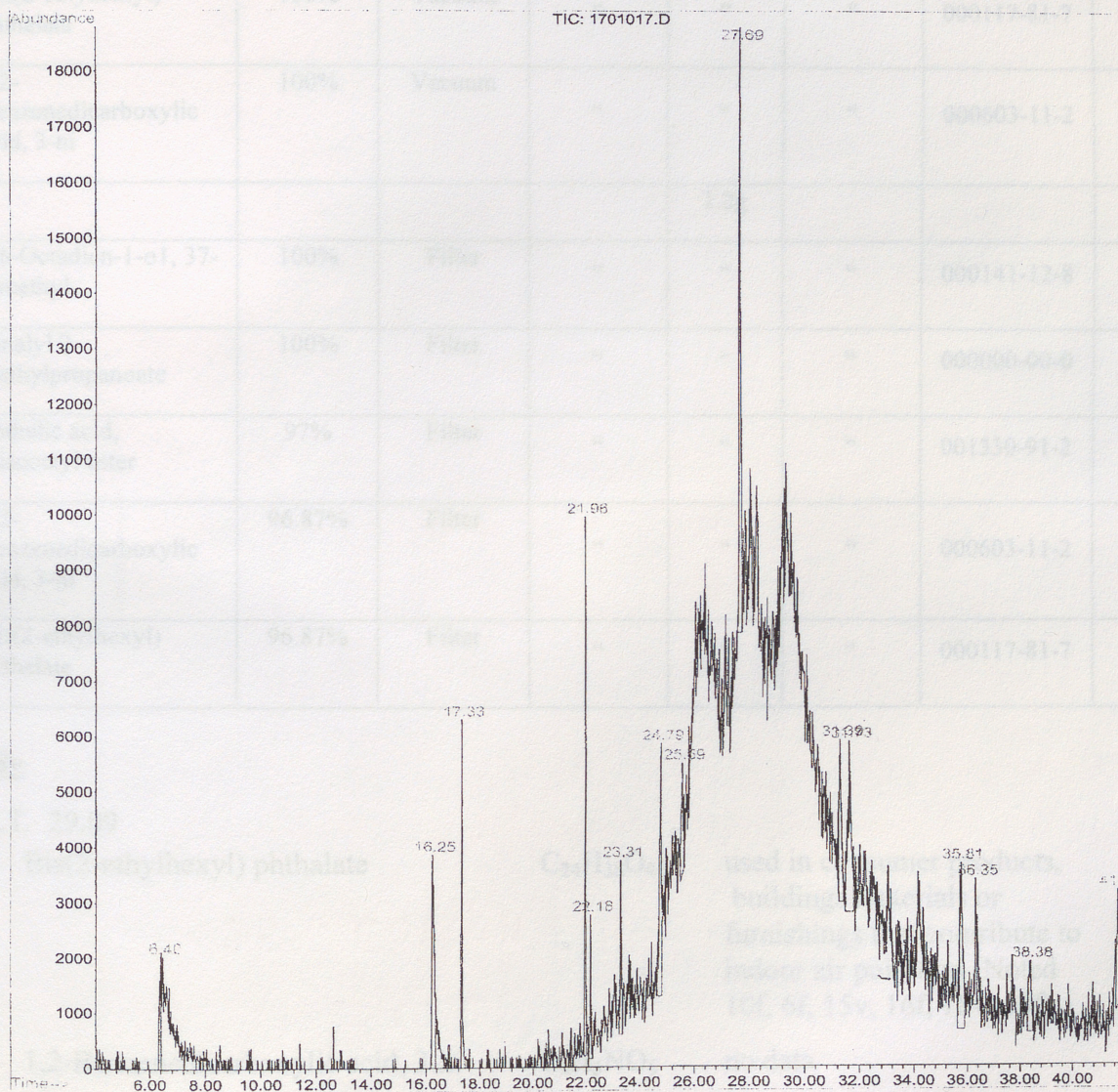
Title : Volatiles

Vial: 17

Operator: Herb Nance

Inst : GC/MS Ins

Multiplr: 1.00



1701017.D ESSOILHS.M Fri Apr 20 18:37:23 2007 GC/MS

Table 18

Zip Code 77099 (Sample #18)

	corr % max	Indoor Source	Zip Code 77099	WT 8.7g	Condition Asthma	cas#	Sample #18
Bis(2-ethylhexyl) phthalate	100%	Vacuum	“	“	“	000117-81-7	18v
1,2-Benzenedicarboxylic acid, 3-ni	100%	Vacuum	“	“	“	000603-11-2	18v
				1.2g			
2,6-Octadien-1-o1, 37-dimethyl-	100%	Filter	“	“	“	000141-12-8	18f
Linalyl 2-methylpropanoate	100%	Filter	“	“	“	000000-00-0	18f
Phthalic acid, diisooctyl ester	97%	Filter	“	“	“	001330-91-2	18f
1,2-Benzenedicarboxylic acid, 3-ni	96.87%	Filter	“	“	“	000603-11-2	18f
Bis(2-ethylhexyl) phthalate	96.87%	Filter	“	“	“	000117-81-7	18f

18v

R.T. 29.09

- | | | |
|---------------------------------------|-------------------|---|
| 1. Bis(2-ethylhexyl) phthalate | $C_{24}H_{38}O_4$ | used in consumer products, buildings materials or furnishings that contribute to indoor air pollution (Noted 10f, 6f, 15v, 16f, 18v, 18f) |
| 2. 1,2-Benzenedicarboxylic acid, 3-ni | $C_8H_5NO_6$ | no data |

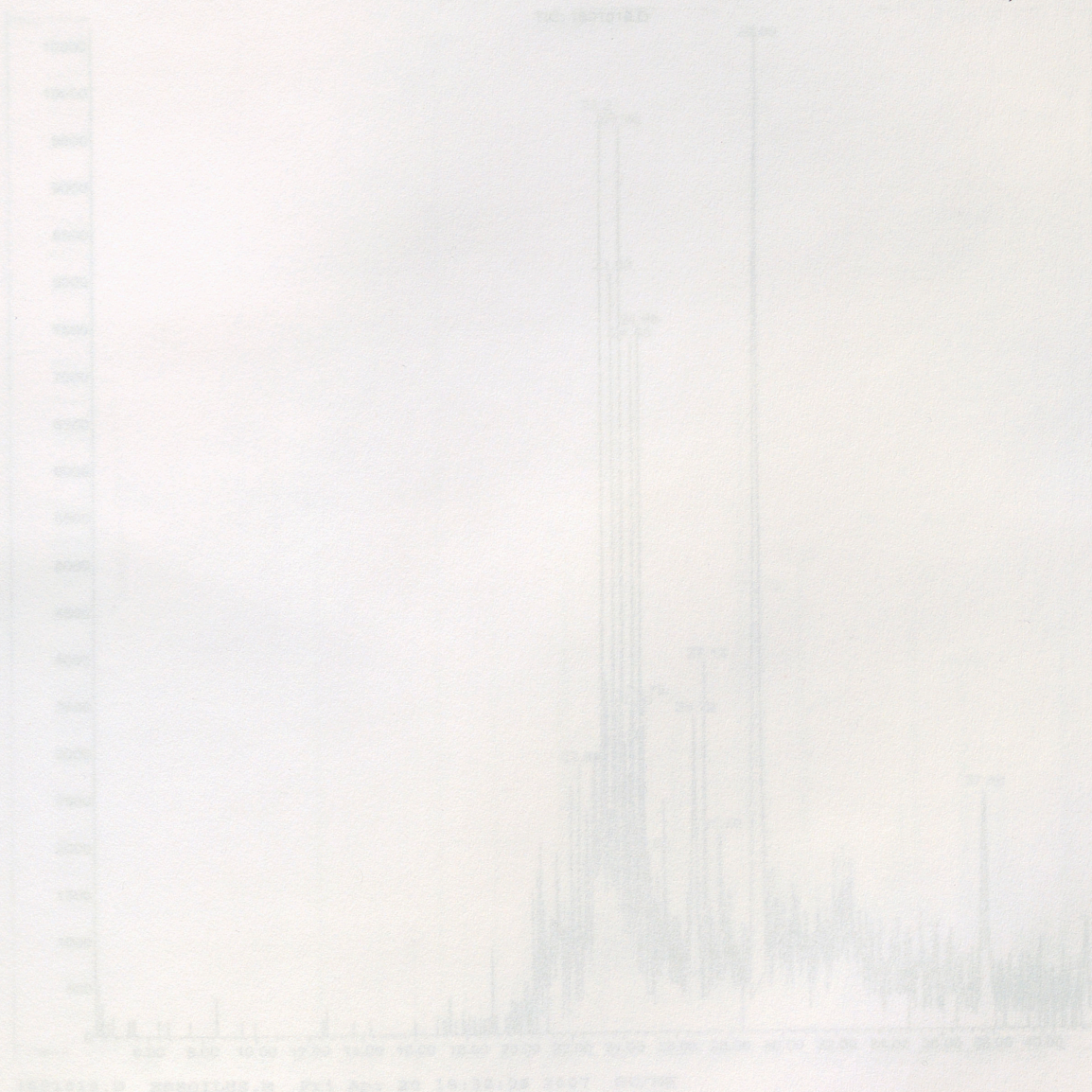
18f

R.T. 17.35

- | | | |
|------------------------------------|-------------------|---------|
| 1. 2,6-Octadien-1-o1, 37-dimethyl- | $C_{12}H_{20}O_2$ | no data |
| 2. 2-methylpropanoate | no data | no data |

R.T. 28.99

- | | | |
|-------------------------------------|-------------------|---|
| 1. Phthalic acid, diisooctyl ester | no data | no data |
| 2. 2-Benzenedicarboxylic acid, 3-ni | $C_8H_5NO_6$ | no data |
| 3. Bis(2-ethylhexyl) phthalate | $C_{24}H_{38}O_4$ | used in consumer products,
buildings materials or
furnishings that contribute to
indoor air pollution (noted
10f, 6f, 15v, 16f, 18v, 18f) |



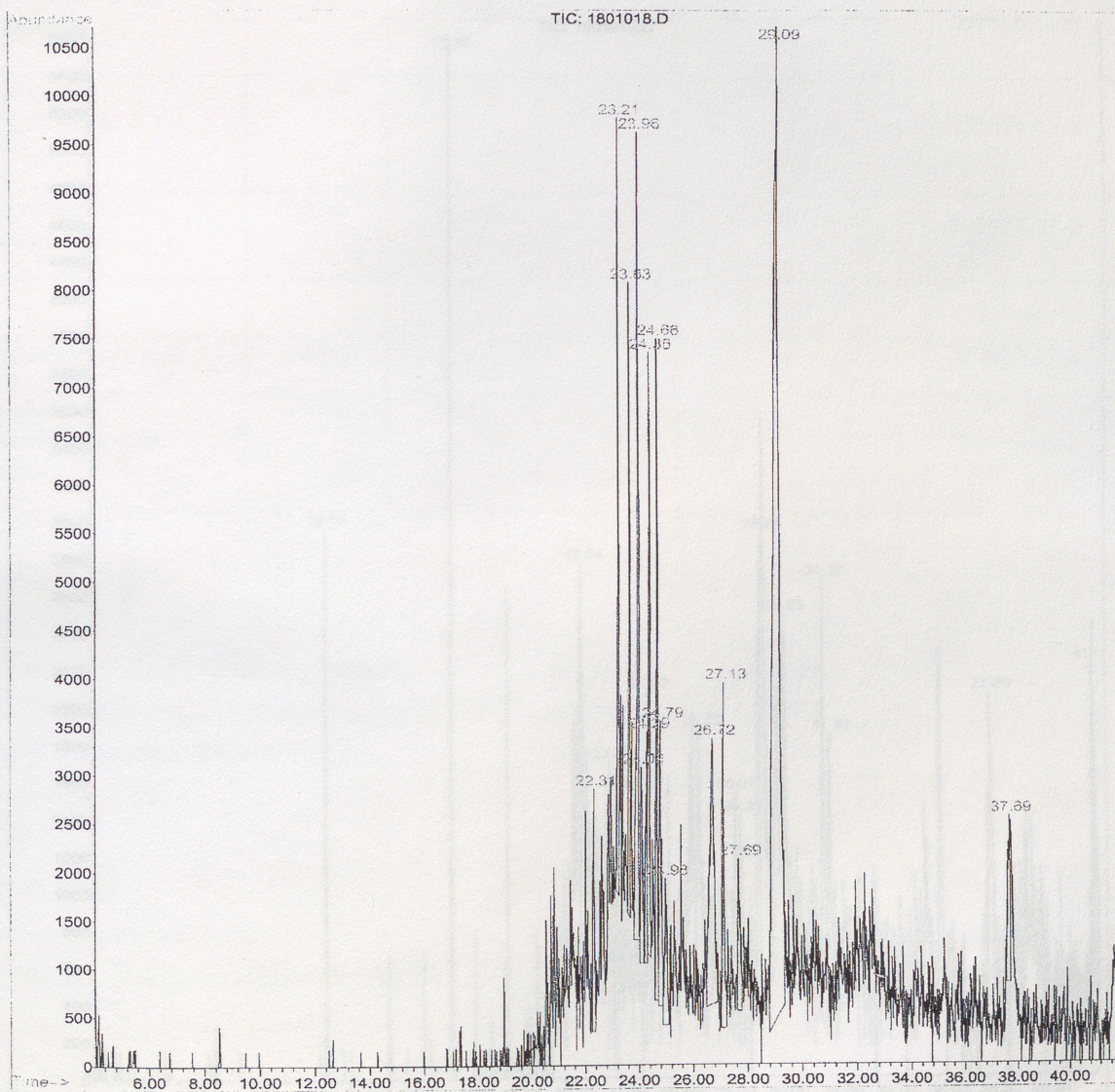
Graph XXXIV

18v (Sample #18)

Area Percent Report

File : C:\HPCHEM\1\DATA\041107\1801018.D
Acq On : 12 Apr 2007 7:16 am
Sample : 18V
Misc :
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles

Vial: 18
Operator: Herb Nance
Inst : GC/MS Ins
Multiplr: 1.00

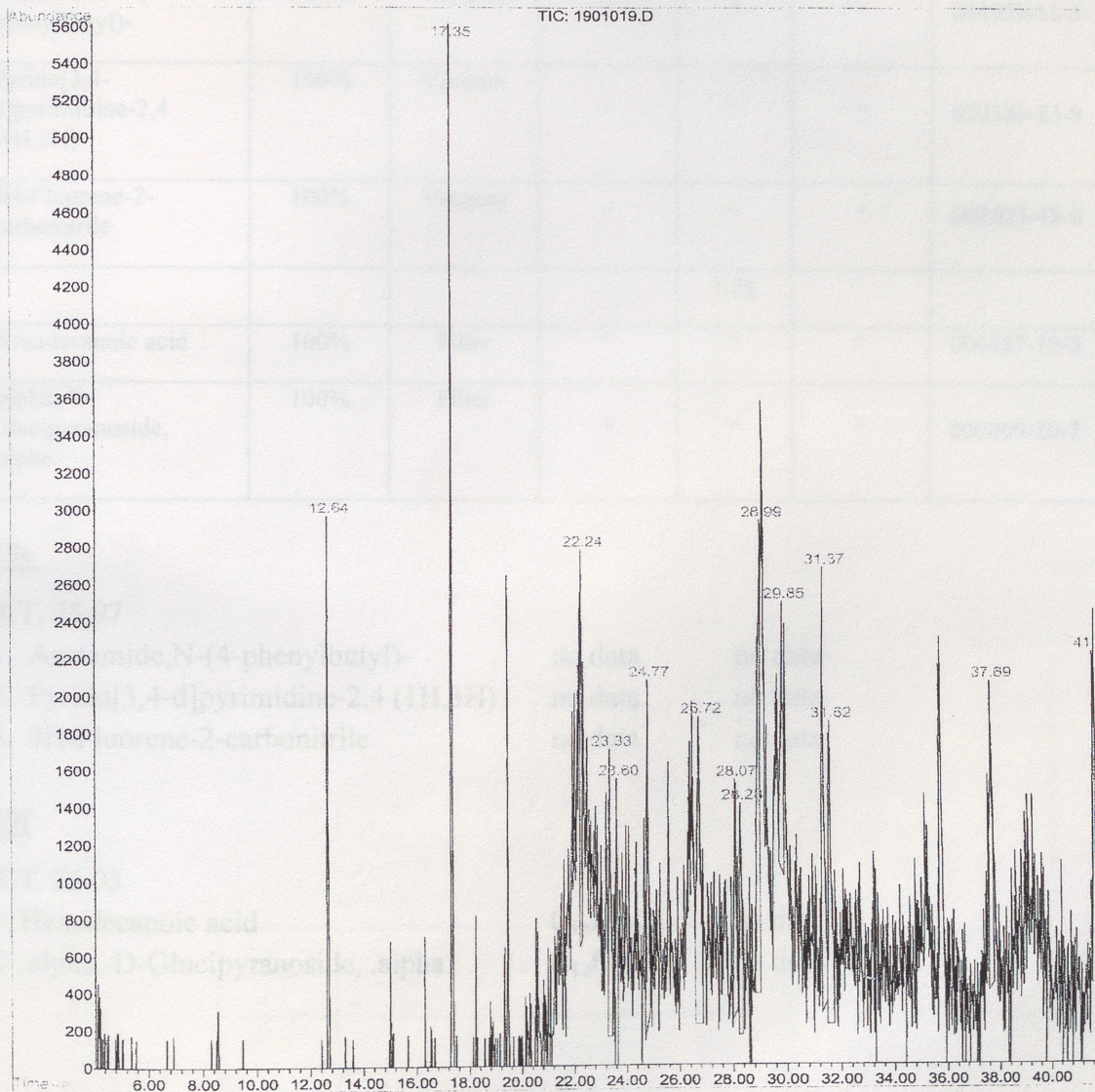


1801018.D ESSOILHS.M Fri Apr 20 18:38:06 2007 GC/MS

Graph XXXV 18f (Sample #18)

Area Percent Report

File : C:\HPCHEM\1\DATA\041107\1901019.D Vial: 19
On : 12 Apr 2007 8:03 am Operator: Herb Nance
Sample : 18F Inst : GC/MS Ins
ISC : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



1901019.D ESSOILHS.M Fri Apr 20 18:38:46 2007 GC/MS

Table 19

Zip Code 77011 (Sample #19)

	corr % max	Indoor Source	Zip Code 77011	WT 1.5g	Condition none	cas#	Sample #19
Acetamide,N-(4-phenylbutyl)-	100%	Vacuum	“	“	“	034059-11-5	19v
Pyrido[3,4-d]pyrimidine-2,4 (1H,3H)	100%	Vacuum	“	“	“	022389-83-9	19v
9H-Fluorene-2-carbonitrile	100%	Vacuum	“	“	“	002523-48-0	19v
				1.2g			
Hexadecanoic acid	100%	Filter	“	“	“	000057-10-3	19f
.alpha.-D-Glucipyranoside, .alpha.	100%	Filter	“	“	“	000099-20-7	19f

19v

R.T. 25.97

- | | | |
|--|---------|---------|
| 1. Acetamide,N-(4-phenylbutyl)- | no data | no data |
| 2. Pyrido[3,4-d]pyrimidine-2,4 (1H,3H) | no data | no data |
| 3. 9H-Fluorene-2-carbonitrile | no data | no data |

19f

R.T. 26.03

- | | | |
|---------------------------------------|-------------------|---------|
| 1. Hexadecanoic acid | $C_{16}H_{32}O_2$ | no data |
| 2. .alpha.-D-Glucipyranoside, .alpha. | $C_{12}H_{22}O_4$ | no data |

Graph XXXVI
19v (Sample #19)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\2001020.D

Acq On : 12 Apr 2007 8:49 am

Sample : 19V

Misc :

MS Integration Params: RTEINT.P

Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)

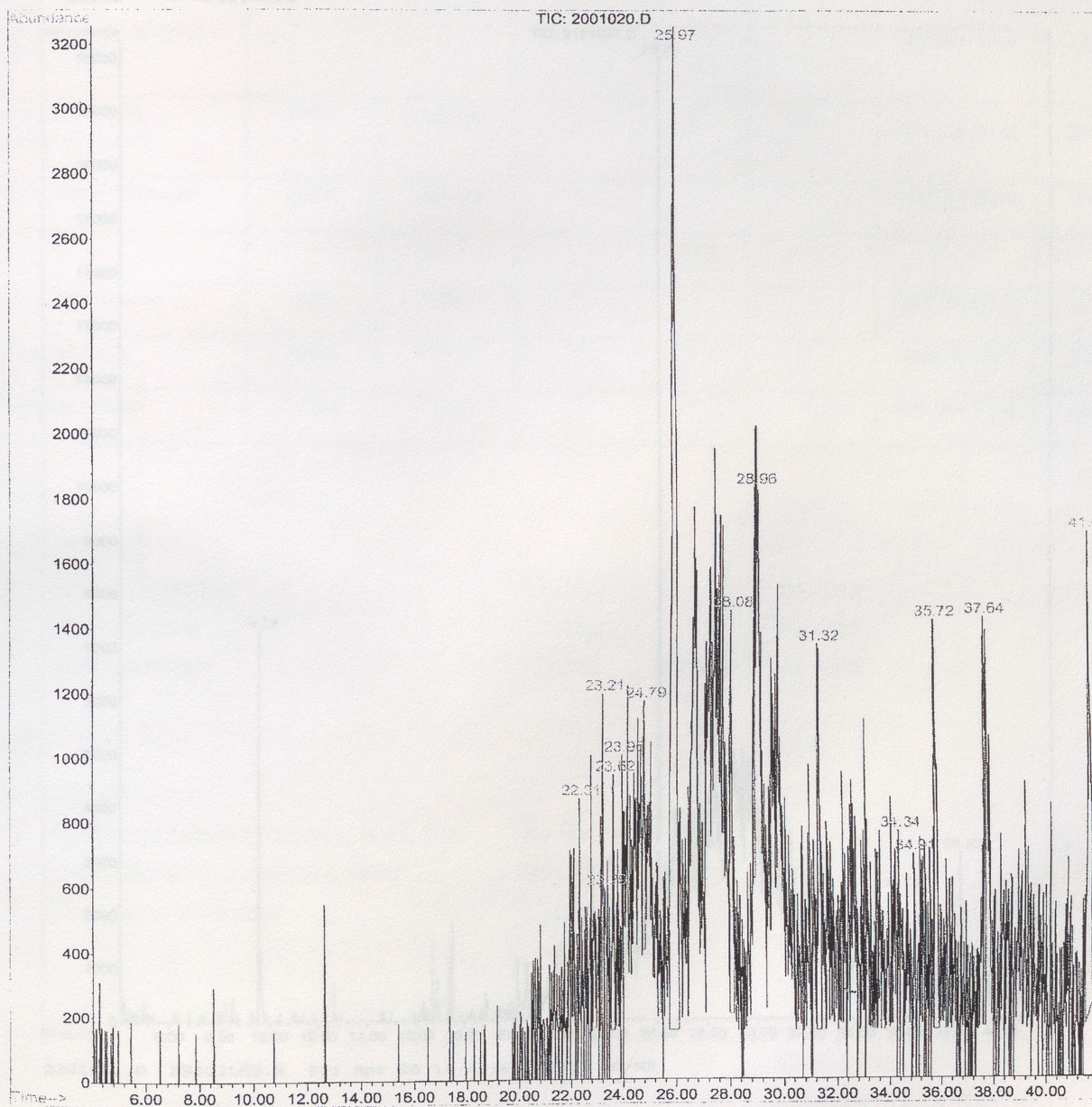
Title : Volatiles

Vial: 20

Operator: Herb Nance

Inst : GC/MS Ins

Multiplr: 1.00



2001020.D ESSOILHS.M Fri Apr 20 18:41:35 2007 GC/MS

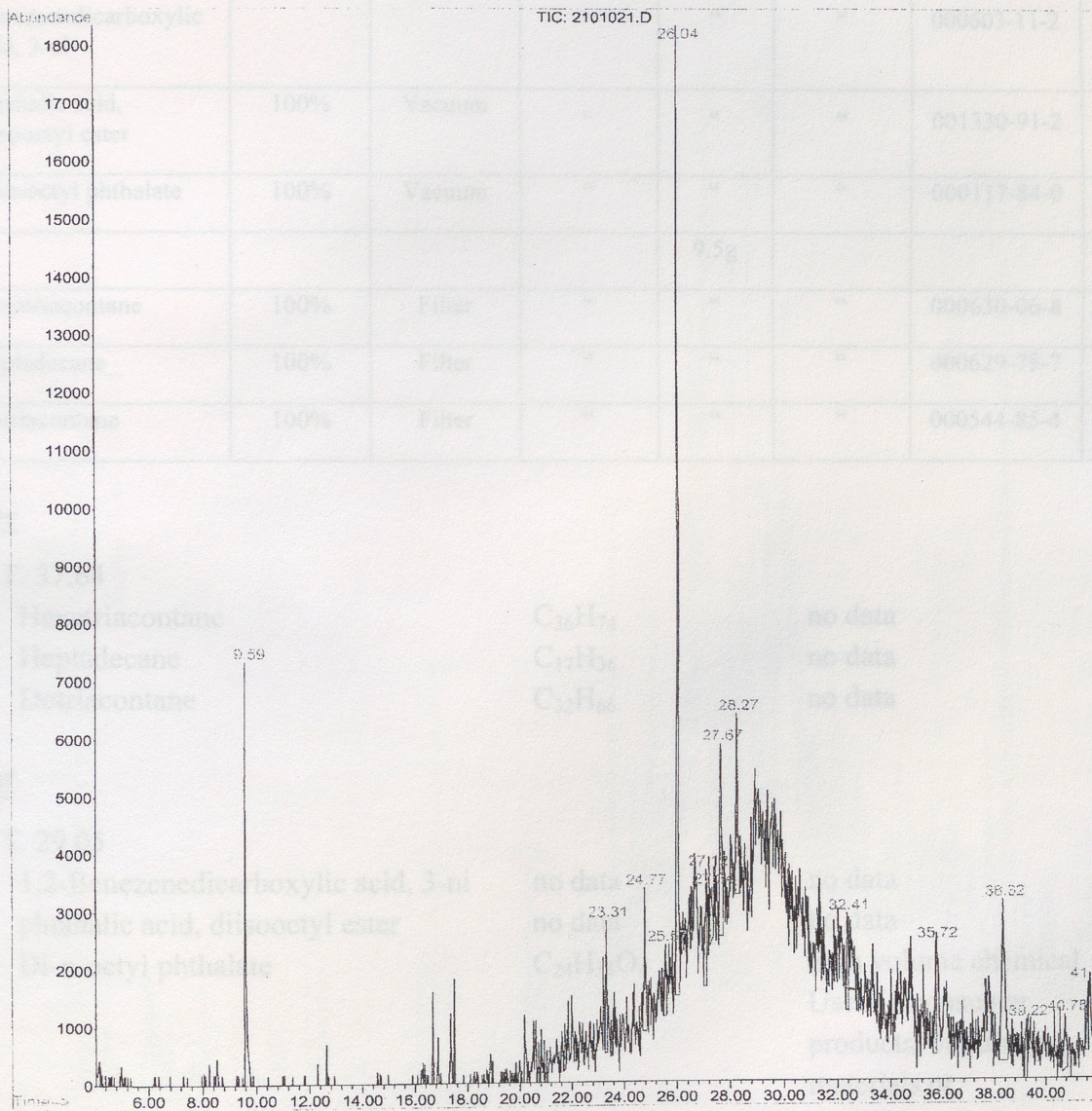
Graph XXXVII

19f (Sample #19)

Zip Code 77382 (Sample #20)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\2101021.D Vial: 21
 Acq On : 12 Apr 2007 9:36 am Operator: Herb Nance
 Sample : 19F Inst : GC/MS Ins
 Misc : Multiplr: 1.00
 MS Integration Params: RTEINT.P
 Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
 Title : Volatiles



2101021.D ESSOILHS.M Fri Apr 20 18:42:49 2007 GC/MS

Table 20

Zip Code 77382 (Sample #20)

	corr % max	Indoor Source	Zip Code 77382	WT 3.5g	Condition none	cas#	Sample #20
1,2-Benzenedicarboxylic acid, 3-ni	100%	Vacuum	“	“	“	000603-11-2	20v
phtahalic acid, diisooctyl ester	100%	Vacuum	“	“	“	001330-91-2	20v
Di-n-octyl phthalate	100%	Vacuum	“	“	“	000117-84-0	20v
				9.5g			
Hexatriacontane	100%	Filter	“	“	“	000630-06-8	20f
Heptadecane	100%	Filter	“	“	“	000629-78-7	20f
Dotriacontane	100%	Filter	“	“	“	000544-85-4	20f

20v

R.T. 37.64

1. Hexatriacontane	$C_{36}H_{74}$	no data
2. Heptadecane	$C_{17}H_{36}$	no data
3. Dotriacontane	$C_{32}H_{66}$	no data

20f

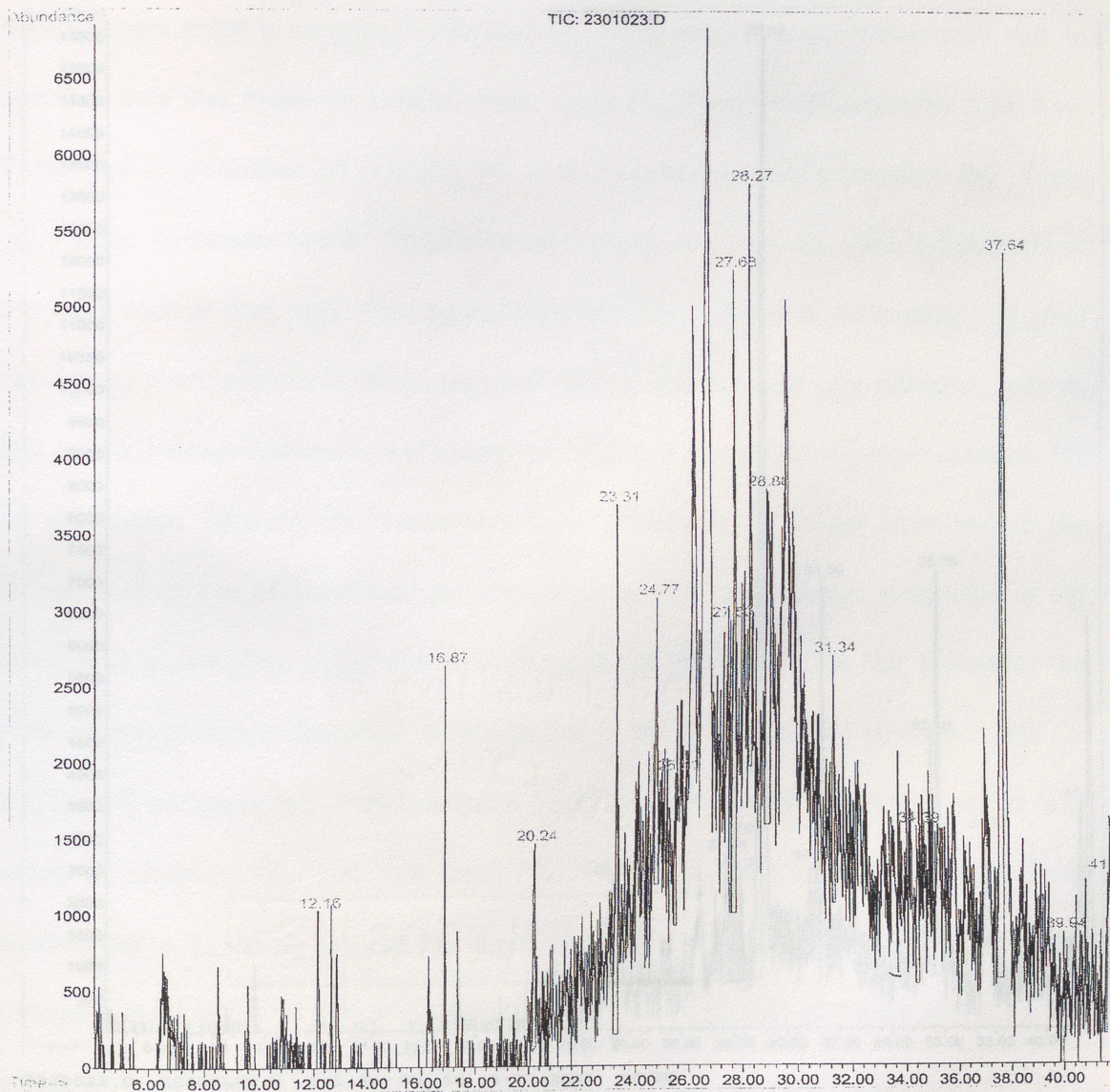
R.T. 29.05

1. 1,2-Benzenedicarboxylic acid, 3-ni	no data	no data
2. phtahalic acid, diisooctyl ester	no data	no data
3. Di-n-octyl phthalate	$C_{24}H_{38}O_4$	high volume chemical Used in consumer products, buildings materials or furnishing, that contribute to indoor air pollution synthetic resin and rubber adhesives.

Graph XXXVIII
20v (Sample #20)

Area Percent Report

ata File : C:\HPCHEM\1\DATA\041107\2301023.D Vial: 23
Acq On : 12 Apr 2007 11:09 am Operator: Herb Nance
Sample : 20V Inst : GC/MS Ins
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
Title : Volatiles



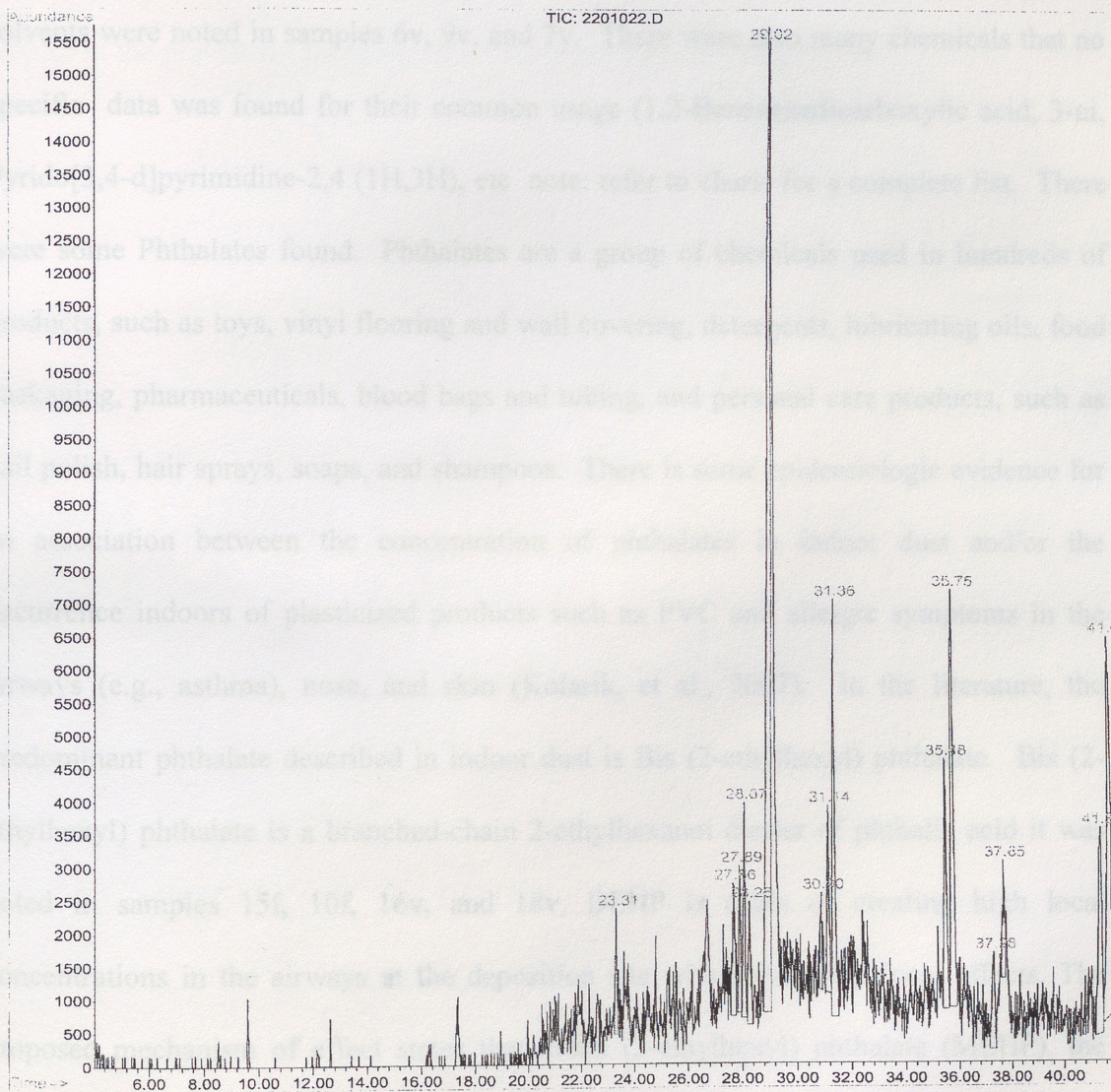
2301023.D ESSOILHS.M Fri Apr 20 18:43:42 2007 GC/MS

Graph XXXIX

20f (Sample #20)

Area Percent Report

Data File : C:\HPCHEM\1\DATA\041107\2201022.D Vial: 22
 Acq On : 12 Apr 2007 10:22 am Operator: Herb Nance
 Sample : 21F Inst : GC/MS Ins
 Misc MS Integra 20f rams: RTEINT.P Multiplr: 1.00
 Method : C:\HPCHEM\1\METHODS\ESSOILHS.M (RTE Integrator)
 Title : Volatiles



2201022.D ESSOILHS.M Fri Apr 20 18:43:17 2007 GC/MS

CHAPTER 4

RESULTS AND DISCUSSION

There were a variety of chemicals found. Most of the chemicals noted were from everyday household products such as cleaning agents, oils and fragrances. Tridecanol and 1-Hexacosanol which are types of fatty oils used in cosmetics, food, and as industrial solvents were noted in samples 6v, 9v, and 7v. There were also many chemicals that no specific data was found for their common usage (1,2-Benzenedicarboxylic acid, 3-ni, Pyrido[3,4-d]pyrimidine-2,4 (1H,3H), etc note: refer to charts for a complete list. There were some Phthalates found. Phthalates are a group of chemicals used in hundreds of products, such as toys, vinyl flooring and wall covering, detergents, lubricating oils, food packaging, pharmaceuticals, blood bags and tubing, and personal care products, such as nail polish, hair sprays, soaps, and shampoos. There is some epidemiologic evidence for an association between the concentration of phthalates in indoor dust and/or the occurrence indoors of plasticized products such as PVC and allergic symptoms in the airways (e.g., asthma), nose, and skin (Kolarik, et al., 2007). In the literature, the predominant phthalate described in indoor dust is Bis (2-ethylhexyl) phthalate. Bis (2-ethylhexyl) phthalate is a branched-chain 2-ethylhexanol diester of phthalic acid it was noted in samples 15f, 10f, 16v, and 18v. DEHP is cable of creating high local concentrations in the airways at the deposition site with subsequent local effects. The proposed mechanism of effect states that mono (2-ethylhexyl) phthalate (MEHP), the primary hydrolysis product of DEHP, mimics the inducing prostaglandins (PG) PGD(2), 9alpha, 11 betaPGF2, and PGF2alpha, and thromboxanes in the lungs, thereby increasing the risk of inducing inflammation in the airways, which is characteristic of asthma (Oie,

CONCLUSION AND RECOMMENDATIONS

Hersoug & Madsen, 1997). In Sample 18v the residence was noted to have and occupant that has history of asthma. Bis(2-ethylhexyl)phthalate was a chemical noted in sample 18v, but a significant correlation could not be made due to the scope of the study. However, using the settle house dust method and the GC/MS in identifying chemicals that can potentially trigger asthmatic or other adverse respiratory illnesses might be helpful in the preventive treatment of some respiratory ailments.

Identifying a variety of chemicals found in dust. The second main finding of this study is related to the chemical compounds known as phthalates. Phthalates were a chemical found in several dust samples. Phthalates are a group of chemicals used in hundreds of products, such as toys, vinyl flooring and wall covering, detergents, lubricating oils, food packaging, pharmaceuticals, blood bags and tubing, and personal care products, such as nail polish, hair sprays, soaps, and shampoos. Epidemiological studies have suggested an association between exposure to phthalate plasticizers including di-(2-ethylhexyl) phthalate (DEHP), and increased prevalence of asthma, rhinitis or wheezing (Nielsen et al. 2007). There were several homes that phthalates were found in the dust sample. One of the occupants reported having a history of asthma, but a significant correlation between the detected phthalates and the occupants' asthmatic condition is beyond the scope of this study.

CONCLUSION AND RECOMMENDATIONS

The main objective of this study was to see if the collection of dust by household items; such as the dust from an air condition filters and vacuum bags would yield any chemicals after being processed and analyzed with the GC/MS. There were over 800 chemicals that displayed peaks when analyzed. The main finding from this study was that by using The Settled Dust Method (SDH) proved to be very reliable tool for identifying a variety of chemicals found in dust. The second main finding of this study is related to the chemical compounds known as phthalates. Phthalates were a chemical found in several dust samples. Phthalates are a group of chemicals used in hundreds of products, such as toys, vinyl flooring and wall covering, detergents, lubricating oils, food packaging, pharmaceuticals, blood bags and tubing, and personal care products, such as nail polish, hair sprays, soaps, and shampoos. Epidemiological studies have suggested an association between exposure to phthalate plasticizers including di-(2-ethylhexyl) phthalate (DEHP), and increased prevalence of asthma, rhinitis or wheezing (Nielsen et al.2007). There were several homes that phthalates were found in the dust sample. One of the occupants reported having a history of asthma, but a significant correlation between the detected phthalates and the occupants' asthmatic condition is beyond the scope of this study.

REFERENCES

- Bornehag, G. C., Sundell, J., & Sigsgaard, T. (2004). Dampness in buildings and health(DBH).report from and ongoing epidemiological investigation on the association between indoor environmental factors and health effects among children in Sweden. *Indoor Air*, 14 (suppl 7) 59-66.
- Bornehag C. G., Lundgren B., Weschler, ChJ., Sigsgaard, T., Hägerhed-Engman. L.,& Sundell, J. Phthalates in indoor dust and their association with building characteristics. *Environ Health Perspect.* 1399–1404.
- Brown, T. L., LeMay, H. E.,& Bursten, B.E. (2000) *Chemistry the central science*. NJ:Prentice-Hall,Inc.
- Elliott, L., Arbes SJ, Harvey, ES., Lee, RC., Salo, PM., Cohn, RD., London, SJ., Zeldin, DC. (2007) Dust weight and asthma prevalence in the National Survey of Lead and Allergens in Housing (NSLAH). *Environ Health Perspect.* 115 (2) 215-220.
- Kolarik, K., Naydenov, K., Larsson, M., Bronehag. G. C., & Sundell, J. (2007). The association between phthalates in dust and allergic diseases among Bulgarian children. *Environ Health perspect*, 166(1) 98-103.
- Kumar, P., (2001). Characterisation of indoor respirable dust in a locality of Delhi, India. *Indoor Built Environ.* (10) 95-102.
- Larsen, S. T., Hansen, J. S., Hansen, E. W., Clausen, P. A., & Nielsen G. D. (2007). Airway inflammation and adjuvant effect after repeated airborne exposures to di(2-ethylhexyl)phthalate and ovalbumin in BALB/c mice. *Toxicology.* 235 (1-2) 119-29.
- Lioy, J. P., Freeman, G.C. N.,& Millette, R. J.(2002) Dust: a metric for use in residential and building exposure assessment and source characterization. *Environ Health Perspect.* 110(10) 969-982.
- McCrone, W. C. (1976). *Air pollution*. Academic Press., (3) 101-102.
- Martens, M. M., Bailey, J., & White, P.A. (2004). The mutagenic hazards of settled house dust. "Mutation Research 567", 401-425.
- Oie, L., Hersoug, L. G., & Madsen, J. O. (1997). Residential exposure to plasticizers and its possible role in the pathogenesis of asthma. *Environ Health Perpect.* 105 (9) 972-8.
- Wallace, L. A. (2001). Human exposure to volatile organic pollutants: implications for indoor air studies. *Energy environ*, 269-301

World Health Organization. Geneva: World Health Organization; 2003 [accessed 7 November 2004]. Children at Risk! Main health Effects of Exposure to Environmental Risk Factors

