



Excelchem Environmental Labs  
1135 W. Sunset Blvd., Ste. A  
Rocklin, CA 95765  
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July 30, 2010

Dr. Alisher Abdul  
A-Z Comp  
1961 Hunter Dr.  
Rocklin, CA 95765  
916.315.0211

Subject: Mass Retention Comparison Study of 1.00 Gram of HRCM versus  
5.00 Grams of GAC

Dear Dr. Abdul,

At your request, Excelchem Environmental Labs performed a study to determine the mass of various substances retained by HRCM (high reactivity carbon mixture developed by Dr. Viktor Petrik from Russia) and GAC (granular activated carbon).

The results are summarized on the attached chart.

If you have any questions, please feel free to contact me.

Sincerely,

John Somers  
Laboratory Director



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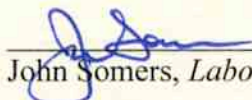
**Analysis Performed for:**

Dr. Alisher Abdul  
A-Z Comp  
1961 Hunter Drive  
Rocklin, CA 95765  
916.315.0211

Substance	Mass (g) Retained by 1.00 g HRCM	Mass (g) Retained by 5.00 g GAC
Acetonitrile	52.5	4.3
Benzene	49.0	4.6
Chloroform	77.9	6.6
Dichloromethane	61.4	5.3
Diesel	41.8	5.3
Gasoline	35.9	3.5
Hexane	30.4	2.6
Isopropyl Alcohol	24.1	3.3
Kerosine	48.5	2.2
Mineral Spirits	21.8	4.2
Naphta	28.6	3.4
Nitric Acid	31.3	11.4
Phosphoric Acid	46.0	5.2
Sulfuric Acid	56.6	7.5
Tetrachloroethene	89.2	6.9
Toluene	47.1	4.5
Turpentine	21.0	5.4
Xylenes	19.4	3.2
Crude Oil	67.2	2.5

Analysis completed 7-30-2010

Analyst Name: Roman Ishchuk, John Somers

  
John Somers, *Laboratory Director*

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## Analysis Performed for:

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A-Z Comp  
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Rocklin, CA 95765  
(916) 315-0211

Substance	Mass (g) Retained by 1.00 g HRCM	Mass (g) Retained by 1.00 g GAC	HRCM Adsorption Ratio Compared to GAC
Acetonitrile	52.5	0.86	61.05
Benzene	49.0	0.92	53.26
Chloroform	77.9	1.32	59.02
Dichloromethane	61.4	1.06	57.92
Diesel	41.8	1.06	39.43
Gasoline	35.9	0.70	51.29
Hexane	30.4	0.52	58.46
Isopropyl Alcohol	24.1	0.66	36.52
Kerosine	48.5	0.44	110.23
Mineral Spirits	21.8	0.84	25.95
Naphta	28.6	0.68	42.06
Nitric Acid	31.3	2.28	13.73
Phosphoric Acid	46.0	1.04	44.23
Sulfuric Acid	56.6	1.50	37.73
Tetrachloroethene	89.2	1.38	64.64
Toluene	47.1	0.90	52.33
Turpentine	21.0	1.08	19.44
Xylenes	19.4	0.64	30.31
Crude Oil	67.2	0.50	134.40

HRCM - High Reactivity Carbon Mixture

GAC - Granular Activated Carbon



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## STANDARD OPERATING PROCEDURE (SOP) LIQUID RETENTION CAPACITY, GRAVIMETRIC

### SCOPE AND APPLICATION

This method is applicable for measuring the retention capacity of inert, non-reactive solid materials. Liquids chosen should be free flowing and not overly volatile at standard temperature and pressure.

### APPARATUS

- Analytical Balance
- Vacuum Filtration Apparatus
- Suction Flask
- Buchner Filter Funnel
- Glass Micro fiber Filter Paper
- Transfer Pipette

### PROCEDURE

1. Weigh the filter funnel with filter paper on the analytical balance and record the weight.
2. Transfer an aliquot of sample (min. 1.2 g) to the filter funnel and filter paper assembly.
3. Choose an aliquot size appropriate to maximize the available surface area when distributed evenly over the filter paper.
4. Weigh the filter funnel with filter paper and sample aliquot and record this *initial* weight.
5. Assemble the vacuum filtration apparatus including the filter funnel, the filter paper, and the sample aliquot.
6. While applying vacuum, apply the liquid to be tested to the surface of the sample.
7. Apply drop-wise, using a transfer pipette, and distribute the liquid across the entire available surface area of the sample.
8. Continue until liquid is no longer absorbed by the sample and excess is suctioned away by the vacuum filtration.
9. Maintain vacuum for 10 minutes to remove all liquid not retained by the sample.
10. Weigh the filter funnel with filter paper and sample aliquot and record this *final* weight.

### CALCULATION

Calculate Liquid Retention Capacity as follows:

$$\text{Mass of Liquid Retained per gram of sample (g/g)} = \frac{(A-B)}{(B-C)}$$

Where:

- A = final weight of sample + filter funnel + filter paper, in grams
- B = initial weight of sample + filter funnel + filter paper in grams
- C = weight of filter funnel + filter paper in grams