**Laboratory #4b**

**Chem 6614 Instrumental Methods of Chemistry**

**SUNY Alfred State College**

***Environmental Sleuthing***

**4.1b. Background**

Residents living along the river Styx have begun complaining about organic chemical smells emanating from the river water. Angry finger pointing and loud public accusations are directed at the ChemicalsRUs factory where various oxygenated solvents such as diisopropyl ketone, 3-octanol and tetrahydrofuran are manufactured in tank car quantities. The company has vigorously disputed the accusations insisting that the level and kind of effluents it releases into the water are both too low and not easily soluble in water. The company’s chief chemist, Dr. Herbert Sourdough, flatly asserts that the contaminant found in the water is acetone, which is not a solvent manufactured by ChemicalsRUs, nor something released by the factory into the river. According to him:

“The level of contamination is simply too high and of the wrong class to be accounted for by my company’s waste streams.”

He has proposed that the defunct waste management firm of the organized crime figure, Benny ‘Frack You’ Giangello is really responsible.. In the 1970s, Giangello’s company, IDOU Inc.(IDumpaOnU Incorporated) was illegally using public waters across the Northeast as receptacles for chemical wastes gathered from New Jersey petrochemical plants. IDOU Inc. particularly favored use of waterways in insolated, upstate regions like those of the river Styx, where police surveillance is sparse and erratic.

“I”ll bet my pH meter some of Giangello’s barrels have rusted out and are now leaking into the river,” says Sourdough. Giangello, when interviewed at Attica prison by the EPA about the accusation responded thusly: “Screw off, youse tree hugging creepos,.”

To settle the matter, the local DEC, already overwhelmed by budget cuts to its staff, hires Team Alfred to settle the matter.

**4.2b. Purpose**

Five samples of river water have been collected from sites near the west bank of the river. Team Alfred is tasked with confirming or denying Dr. Sourdough’s claim and must provide a semi-quantitative estimate of the acetone’s concentration in v/v% using the method of ATR-FTIR should he prove correct. Based on their findings, team Alfred will provide a report on whether the ChemicalRUs factory is responsible, and, if it is not, an opinion on what the next step should be to identify the source. The samples’ were taken at the following sites.

**Sample Site Identification For River Styx Samplings Of Purportedly Contaminated Water**

|  |  |
| --- | --- |
| **Sample #** | **Sample site** |
| 1 taken 6-06-10 10 AM | Near factory effluent pipe, 3 feet below river surface |
| 2 taken 6-06-10 10:20 AM | 100 yards upstream of abandoned boat ramp 1 mile downstream from factory effluent pipe, near bank, 4 feet below river surface |
| 3 taken 6-06-10 10 30 AM | 20 feet out from boat ramp, 3 feet below river surface |
| 4 taken 6-06-10 10:35 AM | 20 feet out from boat ramp , 6 feet below river surface |
| 5 taken 6-06-10 11:30 AM | 100 yards downstream of boat ramp, 20 feet out, 6 feet below river surface |

Note: the River Styx is a slow flowing class 1 river with treacherous, swirling undercurrents . The average depth of the river is ~ 12 feet.

**4.3. How to Proceed**

1. As a team, collectively devise a method using the ATR accessory on the Spectrum 1 Perkin Elmer FTIR to test Dr. Sourdough’s claim about acetone in the water.
2. If he is correct, then devise and execute a simple method to ascertain the ~ level of contamination.
3. If he is not correct based on your method, identify the actual contaminant’s likely functional group using correlation tables and characteristic bands as you did in lab 4a .

**4.4 What to report**

**Each student will submit his/her lab book separately with the following;**

1. A clear and detailed rendition in their own words of the **Procedure** developed to ascertain and measurethe organic contaminant.
2. Tabulation of the collected **Observed Data** derived from the **Procedural** steps

This should include tables of spectral band positions, shapes and intensities as already done in IR experiment 4A. It is advised that if you run synthesized knowns as well as your

Unknowns to help support your assignment..

1. In **Calculations**
2. Provide rationale for unknown contaminant identification whether it be acetone or something else as done in experiment 4A
3. Calculations, graphs and fits relevant to estimating contamination level in v/v %

of acetone in samples 1-5 should Dr Sourdough be correct.

1. **In Results**
2. List identity of likely contaminant
3. If acetone, tabulate v/v% of samples 1-5
4. Provide a paragraph or two evaluating your results in terms
5. Whether the data supports the contaminant coming from the factory.
6. Where the contamination source might be and why if not from the factory.