Project Overview Requirements

CHEM 314

The Project Definition Assignment

3-5 pages, 1 report per group

Introduction- Tell me about your product.

Product Information- Research your consumer product on the internet, call the company. Try to find the answers to your questions- no reason you can't confirm that menthol is the flavor in your gum rather than guessing. Research common ingredients for your product.

Ingredients- Make a table listing every ingredient in your product, including the structures for each. Research what each ingredient is commonly used for, discuss the options for how it can be detected and quantified.

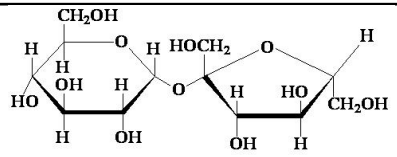
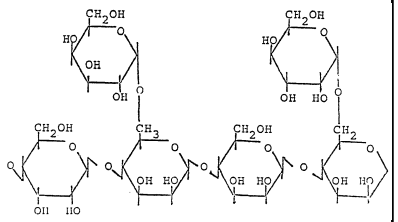
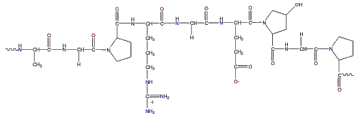
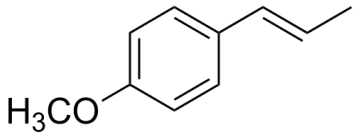
The Plan

References

Appendices

Ingredients- example

* Bold ingredients are listed on the package

Ingredients*	**Formula**	**Structure**	**Info/ Uses**	**Methods**	**Source**
Sugar (sucrose?)	$C_{12}H_{22}O_{11}$		sweetener	HPLC, NMR	wiki
Gum arabic	Complex and variable		Acacia tree sap. Common binding agent in foods (esp liquorice candy), watercolors, & fireworks	HPLC, NMR, FT-IR	wiki
gelatin	$C_6H_{12}O_6$		Mostly produced from animal hides. Common binding agent for foods, pharmaceuticals, cosmetics, photography. Partially hydrolized collagen	HPLC?, FT-IR?, NMR	wiki
Possible Natural flavors					
anethole	$C_{10}H_{12}O$		Derived from liquorice root or anise. Commonly used as a flavor.	GC-MS	wiki

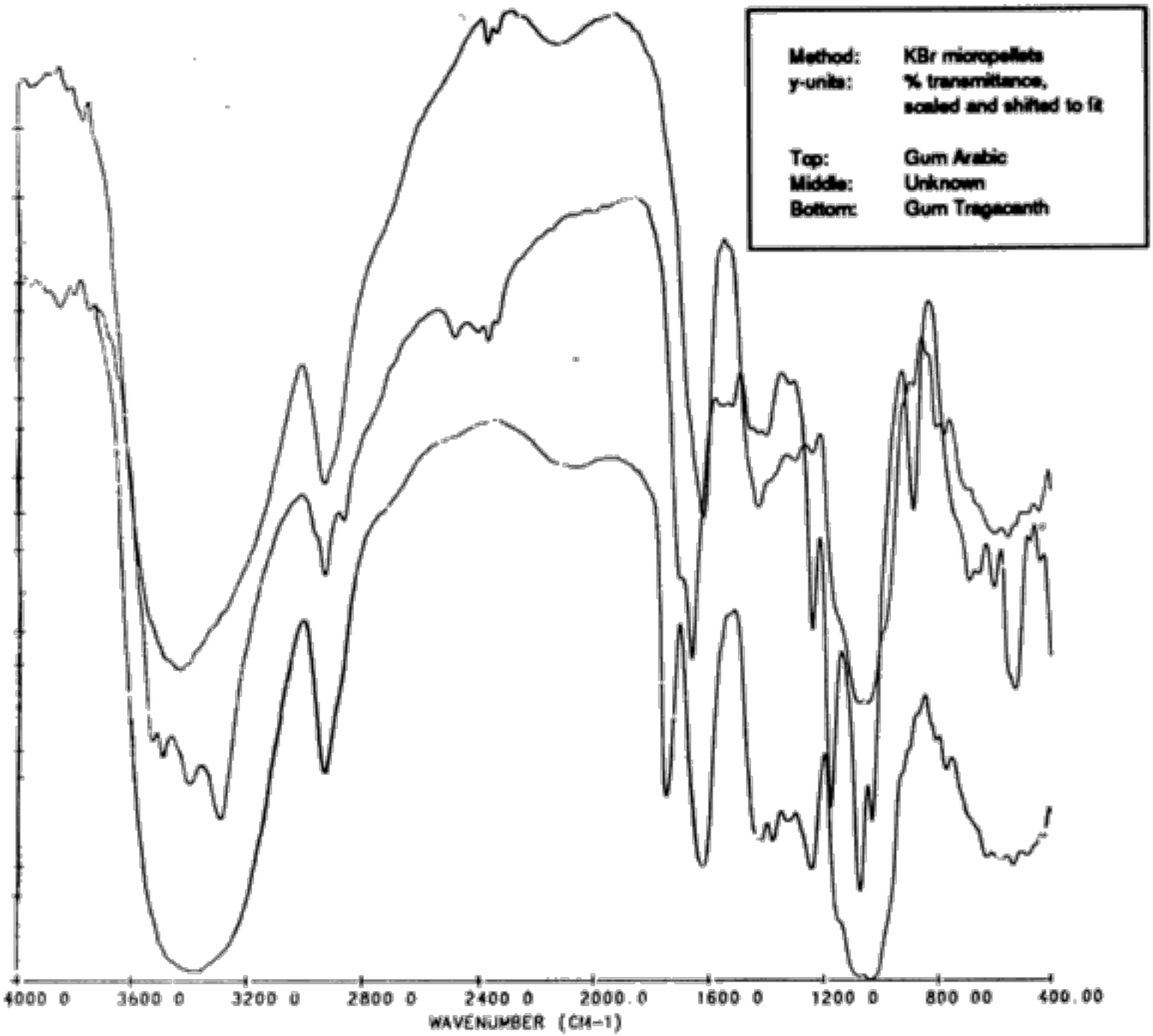
The Plan- Reports 1-5

Tell me how you plan to address **each question** relevant to your product.

1. Research and report a reasonable method for addressing these questions using available instrumentation (sample prep, instrumentation and instrumental conditions).

2. List what materials you will need: solvents, standards, glassware, etc. State the expected results are (retention time, etc).

What parts do you feel will be easy to address? Which parts do you anticipate to be most difficult? How will you address these challenges?


Method: KBr micropellets
y-units: % transmittance, scaled and shifted to fit
Top: Gum Arabic
Middle: Unknown
Bottom: Gum Tragacanth
4000.0
3600.0
3200.0
2800.0
2400.0
2000.0
1600.0
1200.0
800.00
400.00
WAVENUMBER (CM-1)

TLC and GC-MS Analyses of Essential Oil Isolated from Macedonian *Foeniculi fructus*

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Summary

The essential oil of *Foeniculi fructus*, the ripe fruit from the plant *Foeniculum vulgare* Mill. ssp. *vulgare* var. *dulce* Batt. and Trab. (sweet fennel, македонски анасон) was isolated and the main components were identified and quantified using thin-layer chromatography (TLC) and gas chromatography and mass spectrometry (GC-MS). The *Aetherloeum Foeniculi* had pale yellow color and characteristic pleasant odor and was obtained in 3.2% yield (by weight from the plant fruits). The main components of the oil were: *trans*-anethole, 1, (70%), *p*-anisaldehyde, 2, (19%) estragole, 3, (6%) and anisacetone, 4, (2%). The identity of the components was determined by matching the mass spectra to the library spectra. The identity of the main component, *trans*-anethole, was confirmed directly by isolation using column chromatography and indirectly by potassium permanganate oxidation of the essential oil. The oxidation product from this reaction, *p*-methoxybenzoic acid, 16, was isolated and characterized. The potential products of autooxidation of *trans*-anethole (epoxy anethole, anethole glycol and 16) were not detected in the freshly obtained essential oils.

Key words: *Foeniculum vulgare* Mill. ssp.*vulgare* var. *dulce,* sweet –fennel fruit essential oil, chemical composition, GC-MS, *trans*-anethole.

Gas chromatography

GC/MS analysis of *Aetherloeum Foeniculi* was carried out on Agilent Technologies 6890N GC Network system, equipped with 7683B Series injector autosampler and 5975B Inert XL,EI/CI MSD mass spectral detector. GC column: HP-5MS, 30 m x 0.250 mm, 0.25 microns. Temperature programme: starting temperature 70 ºC (2 min), 15 ºC/min to 250 ºC (4 min). The MS detection was carried out in the electron impact mode with an ionization energy of 70 eV and with a scan range of 45-400 amu. The carrier gas was helium with a flow rate of 1 mL/min. The temperature of injector was set at 250 ºC, transfer line temperature was set at 240 ºC and the ion source at 250 ºC. The chromatograms were analyzed using the MSD Chemstation software package and the mass spectra were compared and matched with both NIST 05 and the Wiley 8th edition registry mass spectral databases (W8/N05). The *Aetherloeum Foeniculi* was diluted with methylene chloride to give a 0.5 mg/mL solution of which 1 µL was injected in split mode (1:40). For the quantification purposes percent area was reported without correction indices. Portion of one of the isolated essential oils obtained was injected three times and an average of the percent area for the components were calculated.

The Plan- CYOA

Propose and research 3, choose 2 experiments to perform

Choose Your Own Adventure (Reports 6-7)- Propose **three** questions you can address with UAF instrumentation that you would like to pursue regarding your product. Then write a plan to address each according to guidelines above in "the plan". You will have the opportunity to address two of the three proposed questions.

References

Product information/ ingredients

1. Manufacturer website
2. Wikipedia
3. Other sources of general quick-review information

The Plan

1. Google
2. Experiment resources from class website
3. Journal of Chemical Education
4. Instrument-specific resources
   - Plastics- FT-IR chapter on blackboard
   - HPLC- column manufacturers websites (eg, Agilent, Waters)

Appendices

Appendices- Attach any methods you want to use to the report, so I can evaluate them on the basis of feasibility.