Arguing from Spectroscopic Evidence

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DEMOGRAPHIC AND ACADEMIC MEASURES

Our threshold for significance in this study was a p-value ≤ 0.01

Table S1. Statistical analysis of academic measures for the three cohorts

Measure	Cohort	N	Mean	Median	Mann-Whitney U	z	p-value	Effect Size (r)
OC 1 Course Grade	Cohort A[i]	100	3.6	4.0	4687.5	-0.882	0.378	-
	Cohort B[ii]	100	3.6	4.0				
	Cohort A	100	3.6	4.0	4304.5	-1.858	0.063	-
	Cohort C[iii]	100	3.4	3.5				
	Cohort B	100	3.6	4.0	4023.5	-2.655	0.008	0.18
	Cohort C	100	3.4	3.5				
ACT	Cohort A	100	26.4	27	4661.5	-0.233	0.816	-
	Cohort B	100	26.2	27				
	Cohort A	100	26.4	27	3960.0	-2.237	0.025	-
	Cohort C	100	25.6	26				
	Cohort B	100	26.2	27	3864.5	-2.370	0.018	-
	Cohort C	100	25.6	26				
GPA prior to OC1	Cohort A	100	3.6	3.7	4846.0	-0.377	0.706	-
	Cohort B	100	3.6	3.7				
	Cohort A	100	3.6	3.7	4450.5	-1.344	0.179	-
	Cohort C	100	3.5	3.6				
	Cohort B	100	3.6	3.7	4618.0	-0.934	0.350	-
	Cohort C	100	3.5	3.6				

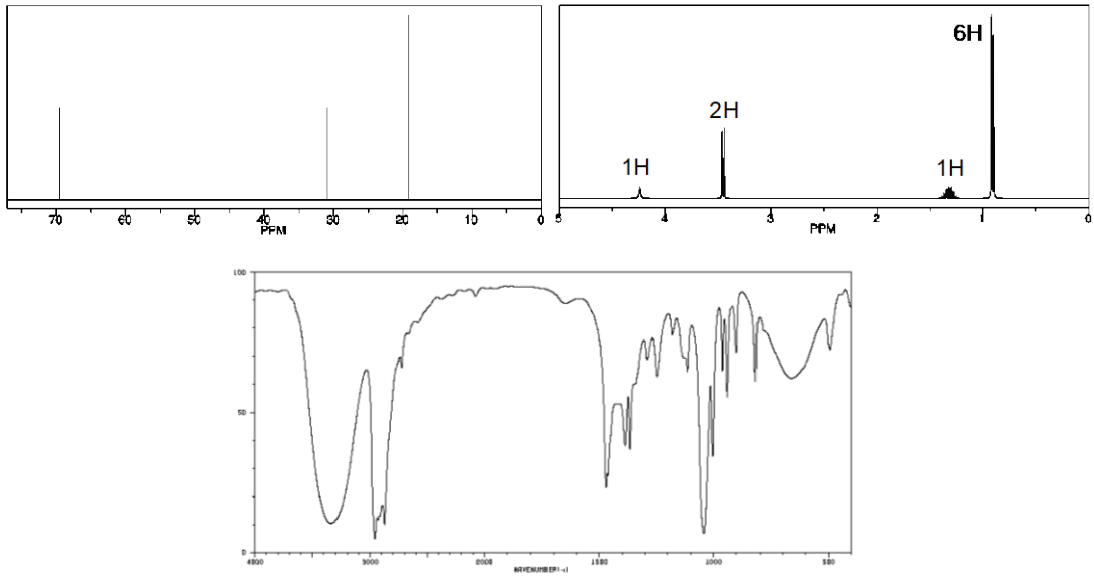
[i] Cohort A: Students who enrolled in two semesters of OCLUE during the 2016-2017 academic year
[ii] Cohort B: Students who enrolled in two semesters of OCLUE during the 2017-2018 academic year
[iii] Cohort C: Students who enrolled in two semesters of OCLUE during the 2018-2019 academic year

PROMPTS MEANT TO ENGAGE STUDENTS IN ANALYSIS, INTERPRETATION, AND USE OF SPECTROSCOPIC EVIDENCE CORRESPONDING TO UNKNOWNS A AND B

The prompts below were meant to engage students in analysis, interpretation, and use of spectroscopic evidence to propose claims as to the identity of two unknowns. As part of addressing Research Question 4, students were randomly placed into two groups with one group receiving 3 spectroscopic traces corresponding to Unknown A (^{1}H NMR, ^{13}C NMR, and IR) and 2 traces corresponding to Unknown B (^{13}C NMR, and IR), and the second group receiving 2 spectroscopic traces corresponding to Unknown A (^{13}C NMR, and IR) and 3 traces corresponding to Unknown B (^{1}H NMR, ^{13}C NMR, and IR). We have reproduced the 3-trace variant of prompts related to both unknowns. The proton NMR spectrum was eliminated from the 2-trace version of each prompt, but they were otherwise identical.

Unknown A

Below are the ^{13}C NMR, ^{1}H NMR, and infrared spectra for a compound with a molecular weight of 74 g/mol.



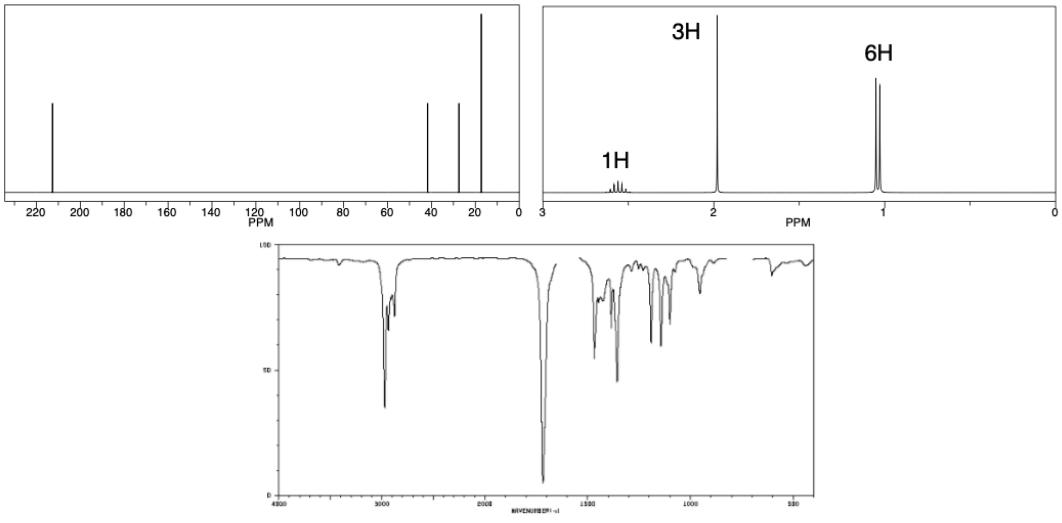
a) Provide a structure that is consistent with this evidence

b) Justify your prediction citing specific strands of spectral evidence

Figure S1. A prompt meant to engage students in analysis, interpretation, and use of spectroscopic evidence corresponding to Unknown A.

Unknown B

Below are the ^{13}C NMR, ^{1}H NMR, and infrared spectra for a compound with a molecular weight of 86 g/mol.



a) Provide a structure that is consistent with this evidence

b) Justify your prediction citing specific strands of spectral evidence

Figure S2. A prompt meant to engage students in analysis, interpretation, and use of spectroscopic evidence corresponding to Unknown B.