Experiment 1 Report (15 pts)

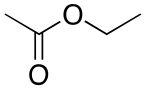
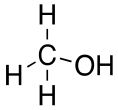
This assignment is to be submitted individually and should be your own work.

Directions: Make a copy of this document and save it to your Google Drive. Type into the designated areas. Boxes can be expanded, but your answers must be in boxes. Answers in the tables can be words or phrases and do not have to be complete sentences. Handwritten reports will have a 1 pt deduction. This includes structures.

All answers for questions not in tables must be answered in complete sentences. Points will be deducted for excessively wordy answers or changing the format of the report, although table boxes can be made bigger if necessary. Avoid having tables or responses to questions going from one page to the other to facilitate grading.

Upload your report as a .pdf to Gradescope and make sure to carefully mark which questions are on each page. Please note that you can be asked for access to the Google Doc version of this assignment if there is suspicion of cheating or plagiarism.

1. a) In the table below, indicate the solubility between the two liquids by identifying each mixture as: **miscible** or **immiscible** based on what you observed in lab (do not use abbreviations) (1 pts)

Solvent		
	miscible	immiscible
	miscible	immiscible
	miscible	miscible
	immiscible	N/A

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b) Pick one of the **miscible** mixtures containing acetone and discuss the intermolecular forces of the two solvents to explain the reason for miscibility at a molecular level. Use the common names of the solvents in your discussion as well as specific IMFs. (2 pts)

I'll select the miscible mixture between methanol and acetone. Acetone and methanol have the intermolecular interaction of hydrogen bonding which results from the OH on methanol being attracted to the O on acetone. Methanol can also hydrogen bond with itself while acetone can only dipole-dipole with itself. Thus as hydrogen bonds are stronger, acetone will prefer to bond with methanol causing the mixture and thus enabling them to coalessce and thus form a uniform solution.

c) Pick one of the **immiscible** mixtures containing water and discuss the intermolecular forces of the two solvents to explain the reason for immiscibility at a molecular level. Use the common names of the solvents in your discussion. (2 pts)

An immisicible mixture that has water is water and hexane. Hexane only the intermolecular force of London dispersion forces since it is a non-polar molecule. Water will want to hydrogen bond with other water while Hexane will want to LDF bond with Hexanes. As a result, in water it will not hydrogen bond with it and thus as we see form its own layer: being an immisicible substance with water.

2. Complete the information below for part C. (2 pts)

a. <u>Melting Point</u>

Unknown Code	**Assigned CAS-RN**	**Experimental Melting Point**	**Literature Melting Point**
B2	86-73-7	108-114 C°	114.76 °C

Reference: (use either the CRC, Merck Index or Knovel Critical Tables, your choice)

86-73-7 . Physical Constants of Organic Compounds. In *CRC Handbook of Chemistry and Physics* [Online], 104th ed; Haynes, W. M., Ed.; CRC Press, 2023. https://hbcp.chemnetbase.com/contents/InteractiveTable.xhtml?dswid=2740 (accessed February 11, 2024)

b. **IR Spectroscopy** (2 pts)
Complete the table below using the spectrum for your unknown that is posted in the Experiment 1 Module.

Chemical bond & Vibrational Mode (note that not all of these may be present in your unknown)	Approx. predicted range of absorption from IR table	Bond Present in Unknown? (yes or no)	Exact absorption of the bond (x axis) from the IR spectrum	Approximate % intensity (y axis) from the IR spectrum
C-H (alkane, stretch)	2850-2975	yes	2919	79%
C-H stretch (alkene or aromatic)	3020-3100	yes	3027, 3040, 3062	79%, 72%, 74%
C=O (stretch)	1630-1820	no		
O-H (stretch)	3200-3650	no		
C-O (stretch)	1000-1250	no		

c. Solubility (2 pts)

	Water	Methanol	Acetone	Ethyl Acetate	Heptane
Solubility (soluble, partially soluble, or insoluble)	INSOLUBLE	INSOLUBLE	SOLUBLE	PARTIAL	SOLUBLE

3. Discuss how the melting point, IR spectroscopy, and solubility data is consistent with your proposed unknown identity. Make sure you include specific IR absorption peaks (or the lack thereof). (2 pts)

Fluorene's, our unknown, melting point in literature is 114.76 C°, which is within our observed findings of between 108-114 C°. This melting point is very specific to Fluorene as the other unknowns have vastly different melting points, i.e. Chalcone with 56°C. Fluorene is also formed via (C6H4)2CH2, which is consistent with our observations of C-H bonds in the IR Spectroscopy. In terms of solubility, Fluorene is non-polar (as a hydrocarbon) and thus is indeed insoluble in water, methanol, and ethyl acetate, and it would make sense that it is insoluble in heptane since it is a non-polar molecule. What is interesting is that we observed it to be soluble in acetone which is polar and thus shouldn't be soluble within.

4. Use this space to reflect on your experience in the lab during the first week. Overall, how was your lab experience this week? Did you learn anything about the strategies you used to prepare that might change how you do things for next week? Did you feel comfortable once you got going? (2 pts)

Overall, I feel pretty good about the lab experience this week. Definitely, there is a lot of review in chemistry I just need to get myself familiar with again. Overall, I learned that preparing with labmates is very important since it will help me stay ahead in my reports and the work I need to do. I feel comfortable when things started to click together from procedure to results: it is a fun experience. Definitely working with others is better than alone.