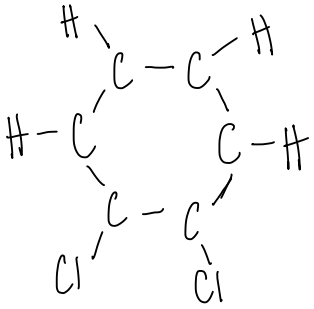
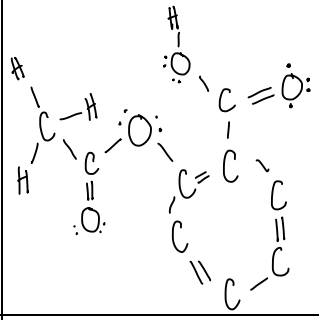
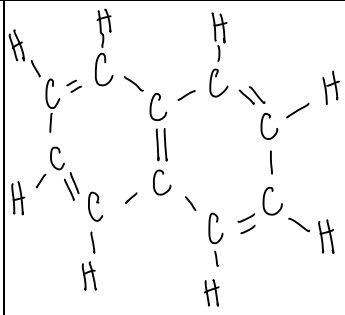
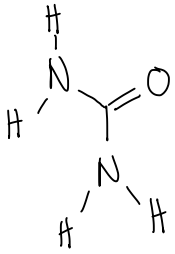
1. Using data from the PubChem database and what you have learned in general chemistry complete the following table. Where more than one value for a measurement has been determined choose the smaller value.

Table 1:

Compound	Lewis Structure	Molar Mass (g/mol)	Melting Point (°C)*	Polar or Non-Polar?	Solubility in water (mg/mL)**
1,4-dichlorobenzene		147 g/mol	53.1 °C	non-polar	< 1 mg/mL
Aspirin		180.16 g/mol	136 °C	Polar	3 mg/mL
Naphthalene		128.17 g/mol	80.26°C	nonpolar	< 1 mg/mL
Urea		60.056 mg/mol	133°C	Polar	545.0 mg/mL

*Round your answer to the nearest whole degree.

**If less than 1 mg/mL record as < 1 mg/mL.

2. According to the data in **Table 1** do polar or non-polar compounds tend to have higher melting points? Provide an explanation for this observation in terms of intermolecular forces between the molecules.

According to Table 1, polar tends to have higher melting points. The higher melting point is due to the strong intermolecular force that is holding the molecule together. Since the intermolecular force is strong, more energy is needed which results in a higher melting point

3. According to the data in **Table 1** do polar or non-polar compounds tend to have higher solubility in water? Provide an explanation for this observation in terms of intermolecular forces between the molecules.

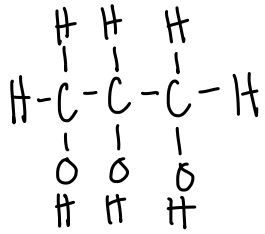
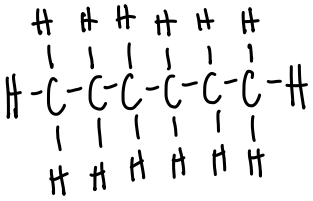
According to the table, polar tends to have higher solubility in water. Molecules that have high solubility in water are likely to be dipole-dipole and water is a dipole-dipole as well, so "like dissolves like" making the molecule or compound easily dissolved in water.

4. Cyclohexane is a non-polar compound that is a liquid at room temperature. Which compounds in **Table 1** would you predict to have good solubility in cyclohexane? Which would have poor solubility in cyclohexane? Explain your choices in terms of the intermolecular forces between the molecules.

Naphthalene will dissolve better with cyclohexane because Naphthalene is a London Dispersion which is a non-polar molecule and Cyclohexane is a non-polar solvent. ("like dissolves like") Urea would be the poorest to mix due to it's polar molecule and it's high solubility in water (a polar solvent)

5. Use the data provided on the PubChem website each of the following compounds to complete the table below. The 3D Conformer and chemical and physical properties of each substance will be especially useful. Note that 1 centipoise (cP) = 1 mPas.

Table 2:

Compound	Lewis Structure	Viscosity (cP)	Longest continuous chain of atoms	Number of oxygen atoms	Hydrogen bonding capacity?
Glycerol		954 cP	Straight-chain	3	3
Hexane		0.297 cp	Straight-chain	0	0
Water		1cP	Alkane	1	4
1-decanol		12 cP	Straight-chain	1	1

6. Which of the molecules in **Table 2** would you expect to have the strongest dispersion forces? Explain how you arrived at your answer?

Hexane would expect to have the strongest dipersion force because it is more larger and heavier.

7. Which of the molecules in **Table 2** would you expect to have the highest surface tension? Explain how you arrived at your answer?

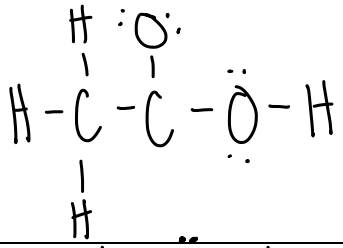
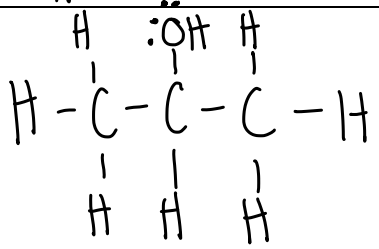
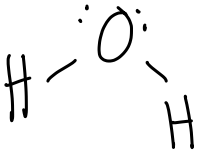
Glycerol would have a high surface tension because of its hydrogen bonding

8. According to the data in **Table 2** does hydrogen bonding increase or decrease a liquids viscosity? Provide an explanation for this observation in terms of intermolecular forces between the molecules.

According to the table, hydrogen bonding can increase liquid viscosity. This is due to the polarity having the ability to move around more and that causes the liquid to be thicker.

9. Complete the following Table.

Table 3:

Compound	Lewis Structure
Acetic acid	
Iso-propyl alcohol	
Water	

10. Vinegar is predominantly a mixture of water and acetic acid, rubbing alcohol is almost pure iso-propyl alcohol and orange juice is mostly water. Using this information and the data in **Table 3** explain the results in this video https://www.youtube.com/watch?v=HVmpDLFGRno in terms of the intermolecular forces present (you may need to copy and paste the link into your browser).

Rubbing alcohol evaporated the fastest due to the molecules intermolecular force being very weak in room temperature

11. Chemists use databases such as PubChem to search for data about chemical compounds. Why is this database preferred over a crowdsourced website such as Wikipedia?

PubChem is more reliable due to it being reviewed and corrected by people with knowledge in chemistry