LE 3.14: Liquid Physical Properties

Due Nov 4 at 5am **Points** 10 **Questions** 4 **Available** until Nov 4 at 5am
Time Limit None **Allowed Attempts** 3

Take the Quiz Again

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	4 minutes	7.5 out of 10

ⓘ Correct answers will be available on Nov 4 at 5am.

Score for this attempt: **7.5** out of 10
Submitted Oct 29 at 11:09pm
This attempt took 4 minutes.

Question 1

2.5 / 2.5 pts

Several physical properties of liquids are determined by their 3-D shape and their IMFs. It is important to realize that it is difficult to make comparisons between very different types of compounds, but it is always possible to understand trends among similar compounds.

Let's start with the temperature at which IMFs break in order for a liquid to boil, called the boiling point. The hotter the temperature, the more energy a system can use to break the IMFs between neighboring molecules.

Based on your knowledge of the relative strength of the four major intermolecular forces, would you expect for a nonpolar molecule to have a higher or lower boiling point than a polar molecule? For this question, assume that the molecules have the same relative size.

- ○ Higher
- ◉ Lower

Correct. Nonpolar molecules will only have dispersion forces, which are generally weaker than dipole-dipole forces. For this example, it is likely that the nonpolar molecule will have a lower boiling point than the polar molecule. Please note that we can only make this comparison because both molecules have the same relative size.

Incorrect

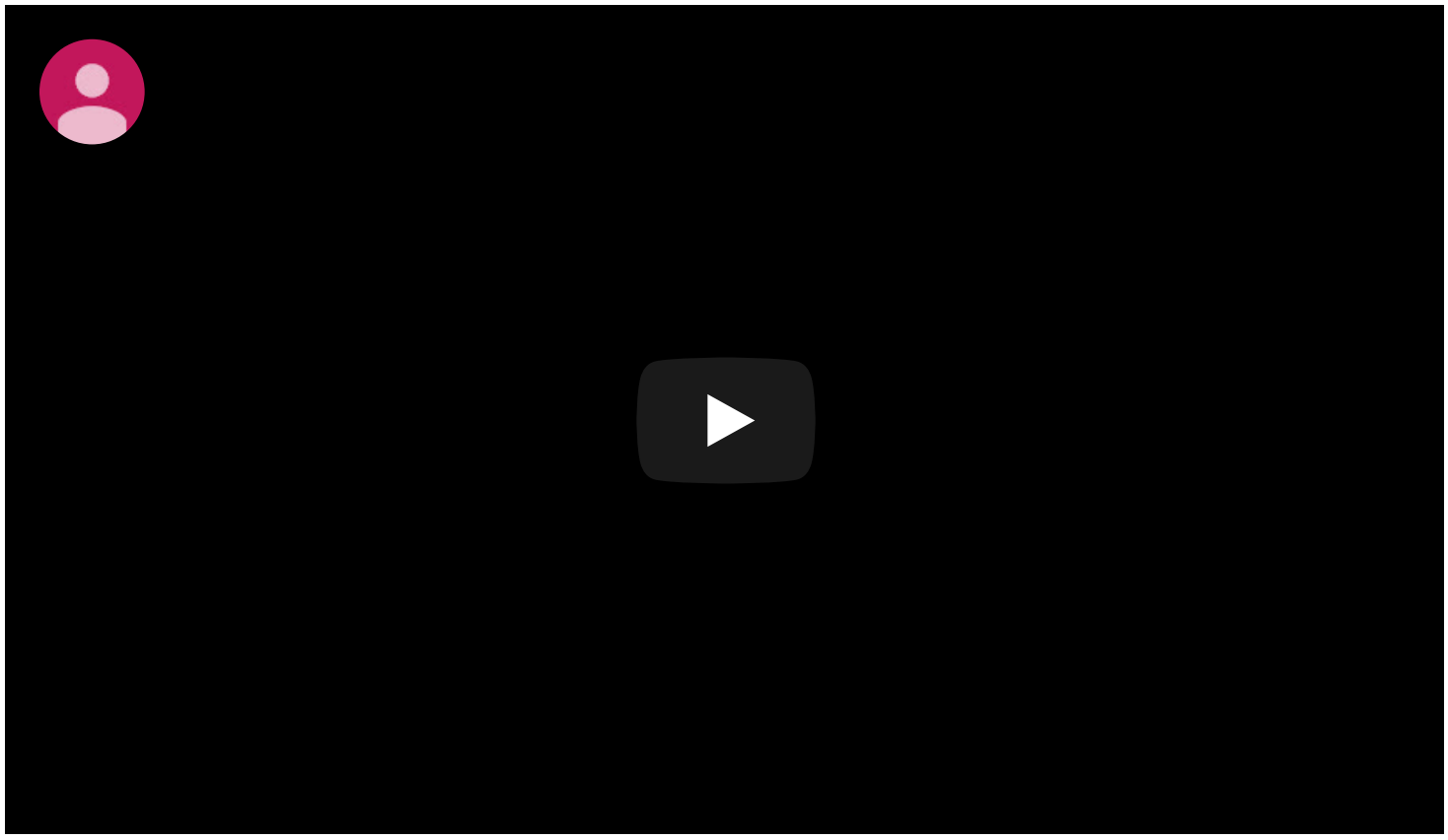
Question 2

0 / 2.5 pts

Vapor pressure is a liquid property related to evaporation. In the liquid (or any substance) the molecules have a distribution of kinetic energies related to the temperature of the system. Because this is a distribution there will always be a few molecules that have enough kinetic energy to overcome the attractive potential energy of the other molecules (the intermolecular force), and escape the liquid into the gas phase. In an open container, these molecules will wander off (diffuse) into the room and out into the atmosphere. Eventually all the liquid will evaporate.

When students first hear about vapor pressure, they often have a difficult time visualizing it. Dr. McCord created a video to help with this issue.

FYI when he says "ones" in the beginning of the video, he is referring to liquid properties.



If a molecule has strong intermolecular forces, would you expect for it to have a high or low vapor pressure?

high

low

Question 3

2.5 / 2.5 pts

Intermolecular forces directly contribute to the cohesive and adhesive forces of a molecule.

- Adhesive forces - the forces of attraction between two different molecules.
- Cohesive forces - the forces of attraction between a liquid and itself

When the adhesive forces are greater than the cohesive forces, a liquid will tend to try to wet the surface. The liquid will maximize attractive forces by [Select] the contact with the surface.

When the cohesive forces are greater than the adhesive forces, a liquid will tend to bead on the surface. The liquid will maximize attractive forces by [Select] the contact with the surface.

Answer 1:

maximizing

Correct. When adhesive forces are stronger than cohesive forces, the liquid will maximize the contact with the surface.

Answer 2:

minimizing

Correct. When adhesive forces are weaker than cohesive forces, the liquid will minimize the contact with the surface.

Question 4

2.5 / 2.5 pts

The last two liquid properties that we will discuss are surface tension and viscosity.

- Surface tension - a property of liquids that arises because the molecules at the surface of a liquid have higher energy than the molecules in the middle of the liquid
- Viscosity - a liquids resistance to flow

Did you know that a paperclip will float on water? This is because the force down from the gravity on the paperclip is not sufficient to overcome the [Select] of the liquid.

Did you know that molecules can become tangled when a liquid is poured? This is because molecules with branches or kinks have a greater [Select] compared to straight-chain molecules. It is harder for them to "slide by" other molecules than it is for straight-chained molecules.

Answer 1:

surface tension

Correct. The IMFs at the surface of the liquid are strong enough to overcome the force of gravity to make the paperclip "float". This phenomenon is called surface tension.

Answer 2:

viscosity

Correct. Branched molecules can tangle with neighboring molecules. This increases the resistance to flow, thereby creating a more viscous liquid.

resistance to flow = slow pouring liquid

This learning exercise reviews the below topics. For more information, please visit the gchem (https://gchem.cm.utexas.edu/index.php) website.

Intermolecular Forces (https://gchem.cm.utexas.edu/imfs/index.php#forces/typesofimfs.html)

Vapor Pressure (https://gchem.cm.utexas.edu/imfs/index.php#liquids/vapor-pressure.html)

Cohesive/Adhesive (https://gchem.cm.utexas.edu/imfs/index.php#liquids/adhesive-cohesive.html)

Surface Tension (https://gchem.cm.utexas.edu/imfs/index.php#liquids/surface-tension.html)

Viscosity (https://gchem.cm.utexas.edu/imfs/index.php#liquids/viscosity.html)

Quiz Score: **7.5** out of 10