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VCE Chemistry ½
Intermolecular Bonding [1.8]
Test

20 Marks. 1 Minute Reading. 16 Minutes Writing

Results:

Quiz Questions	_____ / 15
Extension	_____ / 5

Section A: Quiz Questions (15 Marks)

Question 1 (4 marks)

Tick whether the following statements are **true** or **false**.

	True	False
a. Dispersion forces are found only in non-polar molecules.		
b. The dipoles formed that allow for dispersion forces are temporary and instantaneous and only occur for a split second in molecules.		
c. Fluorine has stronger dispersion forces than neon.		
d. Dipole-dipole interactions can form between a polar molecule and a non-polar molecule.		
e. Hydrogen bonding is a type of intermolecular force which occurs when hydrogen is bonded to any other atom in a molecule.		
f. Hydrogen bonding is stronger than dipole-dipole forces between molecules.		
g. Both ammonia (NH_3) and phosphine (PH_3) are able to form Hydrogen bonds.		
h. When water goes from a liquid state to a solid state, the intermolecular bonds are strengthened due to less kinetic energy being present to disrupt them.		

Space for Personal Notes

Question 2 (5 marks)

Araav is exploring the properties of water and is especially curious as to why it is found in so many different states.

a. Draw the Lewis structure of water indicating the dipoles with polarity arrows. (1 mark)

b. Hence, explain how dipole-dipole interactions are able to form in the molecule you have drawn. (2 marks)

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c. Jeff and Ryan are arguing about whether these dipole-dipole interactions are the same as hydrogen bonds, and whether water can form hydrogen bonds. Explain what a hydrogen bond is and how it can/cannot form between water molecules. (2 marks)

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Question 3 (3 marks)

Consider a molecule of methane - CH_4. Methane is known to have a symmetrical, tetrahedral shape. At room temperature, it is found in a gaseous state.

a. With reference to intermolecular bonds, explain why methane is a gas at room temperature, rather than a solid or liquid. (2 marks)

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b. Jeff remembers learning that dispersion forces are only temporary but wonders how molecules can stay together then for a long period of time. Explain why this is the case. (1 mark)

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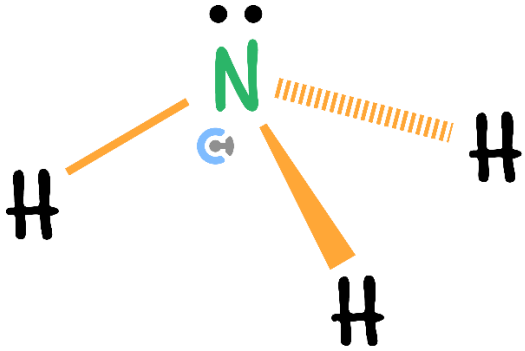
Question 4 (3 marks)

Consider the molecule drawn below:



a. Is this molecule capable of forming hydrogen bonds? Explain why with reference to the two factors required to form a hydrogen bond. (2 marks)

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b. What other types of intermolecular forces are present in this molecule? (1 mark)

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Section B: Extension (5 Marks)

Question 5 (5 marks)

In the lab, Ryan is experimenting with a number of different compounds. Of these, two catch his attention. The first is butane, C_4H_{10}, and the second is nonane, C_9H_{18}.

a. What intermolecular forces are present in these molecules? (1 mark)

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b. Ryan notices that despite both molecules being part of the same homologous series, nonane is much thicker. Why is this the case? (2 marks)

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c. Why is the strength of intermolecular forces directly correlated to boiling point? (1 mark)

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d. Explain whether or not butane could form hydrogen bonds with water. (1 mark)

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