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VCE Chemistry ½

Polarity [1.7]

Test

20 Marks. 1 Minute Reading. 16 Minutes Writing.

Results:

Test Questions	_____ / 15
Extension	_____ / 5

Section A: Test Questions (15 Marks)

Question 1 (3 marks)

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

	True	False
a. Electronegativity is affected by the number of electron shells an atom has.		
b. Dipoles form when an atom loses or gains an electron.		
c. Fluorine is always more electronegative than chlorine.		
d. In an ionic bond electrons are completely transferred to the more electronegative atom, which is not the case in covalent bonds.		
e. The overall polarity of carbon dioxide is non-polar.		
f. CF_4 is a pyramidal non-polar molecule.		

Space for Personal Notes

Sub-Section: Short Answer Questions

Question 2 (4 marks)

Ryan the chemist is experimenting with the molecule HF and ponders how the compound stays together in a liquid state, given that other compounds containing hydrogen such as H_2 are in a gaseous state. To begin Ryan draws a molecule of HF labelling the dipoles that form.

a. Draw the diagram which Ryan might have drawn. (1 mark)

b. Explain why HF maybe a liquid at room temperature whereas hydrogen gas is a gas. (2 marks)

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c. Is this molecule overall polar, or non-polar? (1 mark)

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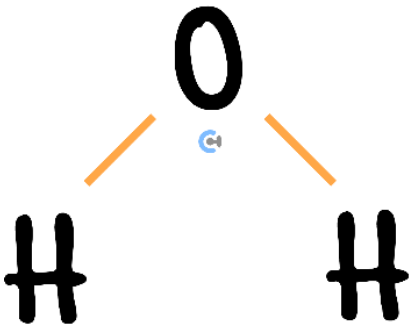
Question 3 (3 marks)

a. Label the following diagram with the relevant polarity arrows. (1 mark)



b. Another molecule which is liquid at room temperature is water. Explain why water is a dipolar molecule and how this affects its overall polarity. (2 marks)

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Question 4 (5 marks)

In the lab, Jeff was working with a number of fluorine-containing covalent molecules.

a. Consider the molecule FOH. Draw the molecule below, describing its molecular geometry. (2 marks)

b. Explain which of the atoms in FOH have the strongest attraction to electrons. What does this mean for the polarity of this atom in the molecule? (1 mark)

_____

_____

c. Another Fluorine containing compound is HF, which has similar chemical properties to the molecule HCl. However, Jasmine works out that it takes much more energy to split a HF molecule into its individual atoms, as compared to a HCl molecule. Why is this the case? (2 marks)

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Section B: Extension (5 Marks)

Question 5 (5 marks)

At the MakeAMolecule (MAM) factory, Daniel is making molecules of his choice. He can choose between hydrogen and the following atoms:

- ATOM *A* – Electronegativity of 4.4.
- ATOM *B* – Electronegativity of 3.5.
- ATOM *C* – Electronegativity of 8.1.

Ryan wants to make a molecule, which is unlikely to ever break.

a. Explain which of the following atoms Ryan should combine. (1 mark)

_____

_____

b. Ryan later combines two "*C*" atoms together, but notices a lack of any polarity at all. Why is this the case? (1 mark)

_____

_____

c. At the MAM factory, Ryan makes a V-shaped molecule using 1 atom "*B*" and two hydrogen atoms. Explain using the concept of electronegativity and molecular geometry what the polarity of this molecule would be. (2 marks)

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d. Explain the trend between the number of electron shells and the electronegativity of atoms. (1 mark)

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