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VCE Chemistry ½
AOS 1 Revision II [1.13]
Test

35 Marks. 1 Minute Reading. 20 Minutes Writing.

Results:

Test Questions	_____ / 30
Extension	_____ / 5

Section A: Test Questions (30 Marks)

Question 1 (3 marks)

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

Statement	True	False
a. NH_3 is a polar molecule due to the presence of $N-H$ bonds, which have an electronegativity difference between 0.4 and 1.8.		
b. Any tetrahedral molecule which is composed of only 3 different elements will always be polar in nature.		
c. Ion-dipole bonds are the strongest type of intermolecular force due to electrostatic attractions between a partially charged ion and a fully charged dipole.		
d. K_2SO_4 is an insoluble compound, meaning the ionic bonds in the lattice are stronger than the ion-dipole bonds acting on it.		
e. In paper chromatography, the stationary phase refers to the paper, whereas the mobile phase is the solvent which the paper is soaked in.		
f. Retention time can only be recorded in column chromatography, with a higher retention time expected for polar molecules when C_2H_6 is used as the mobile phase.		

Space for Personal Notes

Question 2 (8 marks)

Surbhi is working at a local deli and is tasked with producing several deli meats. In order to preserve such meats, nitrates are often added in the form of sodium nitrate. To prepare sodium nitrate, Surbhi first has to dissolve it in water before adding it to the meat.

a. Write the equation for the dissolution of sodium nitrate. (1 mark)

_____

b. Explain, with reference to intermolecular bonding, how sodium nitrate can ionise and dissociate in water. (3 marks)

_____

_____

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c. Draw a diagram to show what happens to the sodium atom in water following dissolution. Label all relevant bonds. (2 marks)

d. Surbhi notices that covalent molecules, such as HCl(g), begin existing in an ionic state when they are in water. Explain why there is a difference between such molecules in gaseous and aqueous states. (2 marks)

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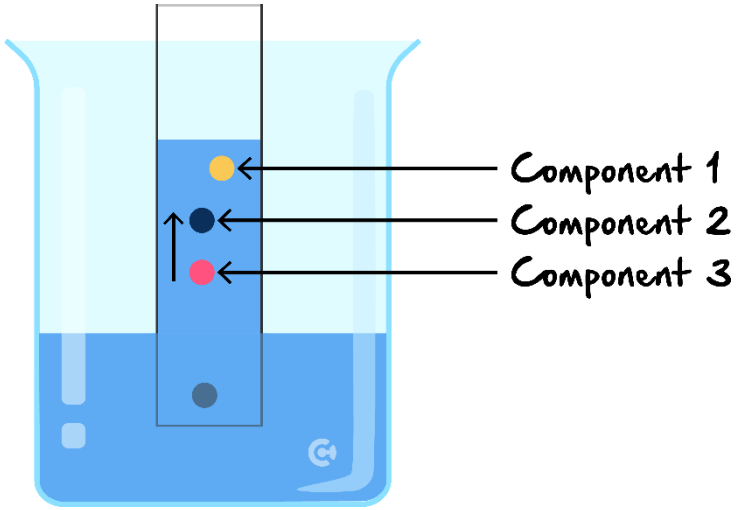
Question 3 (7 marks)

Thin-layer chromatography is a special type of chromatography that utilises a rectangular sheet of plastic or glass coated in a thin layer of powder as the stationary phase. A chemist uses this thin layer technique in order to separate an unknown mixture in order to perform qualitative analysis.

a. What would the chemist be interested in if they are performing qualitative analysis? (1 mark)

_____

b. The chemist uses water as the mobile phase, and after leaving the stationary phase in the solvent for 5 minutes takes it out to reveal the following separation.



Based on the following diagram, which of the components would be the most polar? Justify with reference to adsorption and/or desorption. (2 marks)

_____

_____

_____

c. The chemist believes that component 2 could be phthalocyanine. Explain how the chemist would be able to undertake qualitative analysis to establish whether it is, in fact, this pigment. (2 marks)

_____

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_____

d. For component 3, the chemist measures an R_f value of 0.2. A fellow chemist then reveals a component 3 as being cochineal. It was later found that multiple research papers have found cochineal to have an R_f value of 0.45. Provide two reasons as to why there may be discrepancies in the measured R_f values. (2 marks)

_____

_____

Question 4 (4 marks)

State the solubility of each of the following compounds when mixed with either ethanol (CH_3CH_2OH) or ethane (CH_3CH_3).

a. CO_2. (1 mark)

Ethanol	Ethane

b. HCN. (1 mark)

Ethanol	Ethane

c. NH_3. (1 mark)

Parent Geometry	Molecular Geometry

d. NOBr. (1 mark)

Parent Geometry	Molecular Geometry

Question 5 (5 marks)

Alexander wants to examine hydrogen bonding more in-depth in a chemistry lab.

a. State what is required for a hydrogen bond. (1 mark)

_____

_____

b. Can a molecule such as HCl form hydrogen bonds? Explain your answer. If no, identify the strongest type of intermolecular force that will be present. (2 marks)

_____

_____

_____

c. Would Alex expect a change if he put HCl and H_2O together? Justify your answer. (2 marks)

_____

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Space for Personal Notes

Question 6 (3 marks)

Between CO_2 and C_2H_6 predict which one has a higher boiling point and explain your answer.

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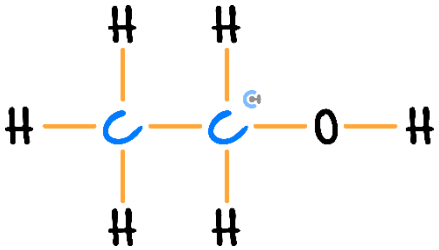
Section B: Extension (5 Marks)

Question 7 (5 marks)

Alexander wants to examine hydrogen bonding more in-depth in a chemistry lab. To do this, he takes a molecule of ethanol, which is drawn below:



a. State what is required for a hydrogen bond. (1 mark)

_____

_____

b. Can a molecule such as HCl form hydrogen bonds? Explain your answer. If no, identify the strongest type of intermolecular force that will be present. (2 marks)

_____

_____

_____

c. Would Alex expect a change if he put HCl and H_2O together? Justify your answer. (2 marks)

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