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VCE Chemistry ½

Principles of Chromatography [1.10]

Test

20 Marks. 1 Minute Reading. 16 Minutes Writing.

Results:

Test Questions	_____ / 15
Extension	_____ / 5

Section A: Test Questions (15 Marks)

Question 1 (4 marks)

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

Statement	True	False
a. The mobile phase and stationary phase refer to periods of time.		
b. Polar components like alcohol will be more attracted to a mobile phase which is also polar such as hexane.		
c. Adsorption refers to a substance sticking to the outside of a solid surface, and desorption is when it is released from that solid surface.		
d. Methane is an example of a polar compound whereas hydrochloric acid is an example of a non-polar compound.		
e. The solvent front refers to the highest distance that the water reaches in paper chromatography.		
f. In qualitative analysis of a compound, if two components have a similar retardation factor under similar laboratory conditions, they are likely to be the same.		
g. A high rate of travel of a component indicates that it has a strong attraction to the mobile phase.		
h. If paper chromatography is conducted with water as the mobile phase, methane will travel a lesser distance up the paper than methanol.		

Space for Personal Notes

Question 2 (6 marks)

In the Lab, Kanta is practising her chemistry skills by making a paper chromatography set-up. For her mobile phase, she uses ethanol from her storage. At the base of the paper, Kanta places three drops – A, B, and C – each of which is a different component.

a. Identify the mobile phase and the stationary phase in this set-up. (1 mark)

_____

b. What can be revealed about the polarity molecule C if it travels the furthest distance? Why? (2 marks)

_____

_____

_____

c. What can be revealed about the polarity of molecule A if it travels the least distance? Why? (2 marks)

_____

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_____

d. Given that the solvent front reaches a distance of 10 cm, with component B travelling a distance of 5 cm, calculate the Rf value for this experiment. (1 mark)

_____

_____

_____

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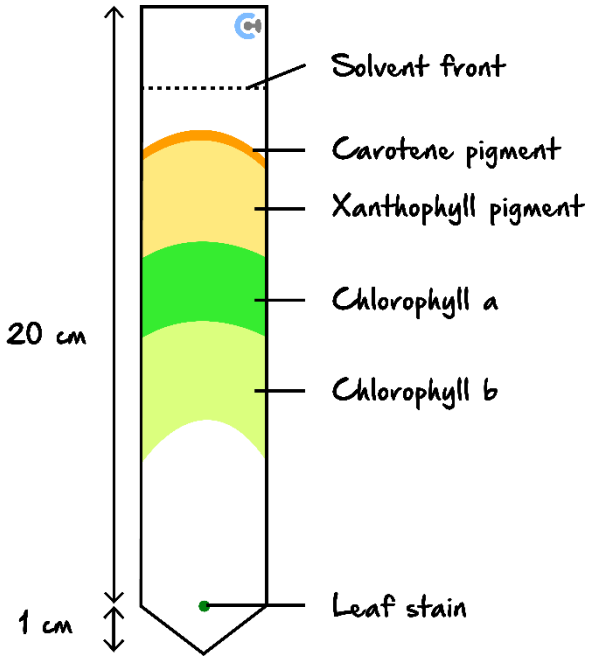
Question 3 (5 marks)

Late at night, Sia wonders what the different pigments are inside of a green leaf stain. She uses the following set-up using water as the mobile phase.



a. With reference to adsorption and desorption, explain the movement of the carotene pigment up the paper. (2 marks)

_____

_____

_____

b. What is likely the polarity of Chlorophyll b? (1 mark)

_____

c. Given that Sia was under pressure to get better results, name and explain a way in which she could have seen more separation of the pigments. (2 marks)

_____

_____

_____

Section B: Extension (5 Marks)

Question 4 (5 marks)

After cramming for his test late at night, Arjun forgets how the experimental procedure for chromatography works.

a. Help Arjun re-arrange the following steps in the correct order. (1 mark)

1) Record the distance travelled by each component.

2) Place a drop of the mixed substance on the base of the paper.

3) Calculate the Rf value of each component.

4) Place the paper into a solution of water.

_____

b. Explain why Rf value is calculated and how it can be used as an experimenter to identify a compound in a mixture. (2 marks)

_____

_____

c. Identify two situations in which the calculated Rf value may not be able to be used in order to identify a compound. (2 marks)

_____

_____

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