Separating Ink Spots in Two Directions

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A lab places a dot of ink at the starting mark of chromatography paper. Solvent 1 moves to the right. The paper dries, then solvent 2 moves upward. In this model each dye moves a fraction of each solvent's travel distance. A dye that spends more time attracted to the paper generally moves a smaller fraction with that solvent.

Reference dye	Fraction with solvent 1	Fraction with solvent 2
A	0.25	0.75
B	0.75	0.25
C	0.75	0.75

1 Which two reference dyes would overlap if the lab used only solvent 1?

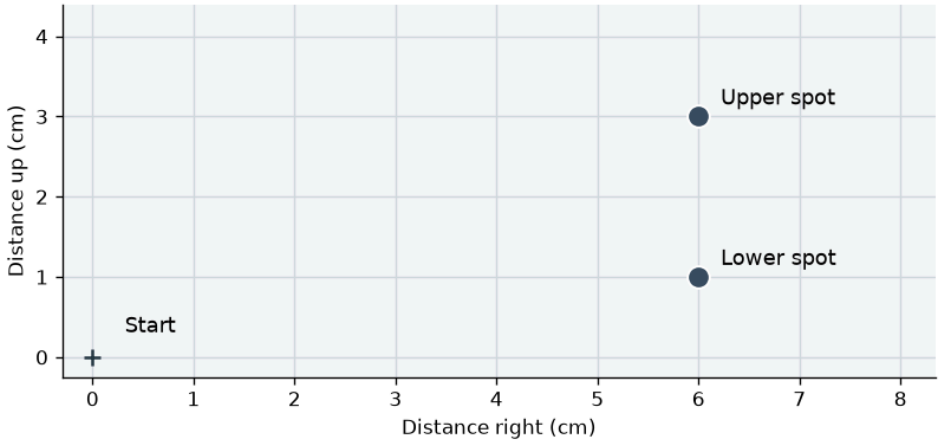
(1) A and B

(2) A and C

(3) B and C

(4) All three

For the unknown ink, solvent 1 travels 8.0 cm and solvent 2 travels 4.0 cm. The figure shows where the two spots end up. The unknown contains only dyes listed in the table.



Unknown ink spots after the two solvent passes.

2 Calculate both travel fractions for the upper spot. Identify the dye that matches both fractions. [1]

Answer and work

3 A student identifies the lower spot as A because it is closer to the starting mark. Use the travel in both directions to evaluate the identification. [1]

Answer and work

4 Predict where a third spot would appear if dye A were added. Explain which present dye travels the same fraction as A with solvent 2. [1]

Answer and work