Name _____ Date _____ Period _____

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3.9 Separation of Solutions and Mixtures

AP Chemistry

Justify answers using intermolecular forces (IMFs). Show your work for calculations.

1. Choose the best method (filtration, chromatography, or distillation) to separate each mixture, and explain your choice.

(a) chalk powder that has settled in water

(b) acetone (boiling point 56 °C) dissolved in water

(c) the colored pigments in a spinach leaf extract

(d) A student pours NaCl(aq) through filter paper. Explain why the salt is not removed.

2. In a paper chromatography experiment, the solvent front moved 9.0 cm from the start line. Spot X moved 6.3 cm and spot Y moved 1.8 cm.

(a) Calculate the R_f value of each spot.

(b) Which spot is more strongly attracted to the paper (the stationary phase)? Explain.

3. A dye has an R_f of 0.45. The solvent traveled 7.6 cm. How far did the dye travel from the start line?

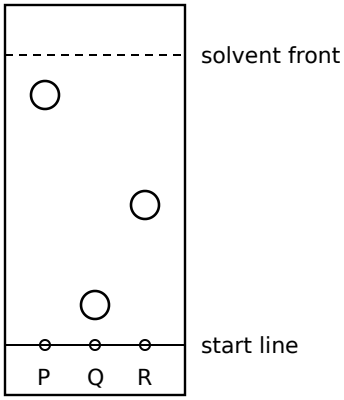
4. Give one reason for each lab detail in paper chromatography.

(a) The start line is drawn in pencil, not pen.

(b) The solvent level must be below the start line.

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5. Three dyes, P, Q, and R, were separated on polar paper using a nonpolar solvent. The chromatogram is shown.



(a) Rank the dyes from least polar to most polar.

(b) Justify the position of dye Q using intermolecular forces.

(c) The same dyes are run on a TLC plate with a nonpolar coating, using water as the solvent. Which dye would travel the farthest? Explain.

6. A mixture of acetone (CH_3COCH_3) and water is distilled. Acetone is polar, but it has no H atom bonded to O, N, or F.

(a) Which liquid collects first in the receiving flask? Justify your answer using intermolecular forces.

(b) The thermometer at the top of the flask reads about 56 °C for several minutes, then rises toward 100 °C. What does this tell the student?

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