

Identifying substances with chemical tests

Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Lab answers

These model answers use the sample data to show how R_f values are calculated, how spots are matched between samples, and how to evaluate the method. Compare your numbers carefully with the working shown.

Level: Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** GCSE C8

Question 1 Calculate all R_f values

P: $2.4 \div 8.0 = \mathbf{0.30}$, $4.8 \div 8.0 = \mathbf{0.60}$. Q: $\mathbf{0.30}$ and $6.4 \div 8.0 = \mathbf{0.80}$. R: $3.75 \div 7.5 = \mathbf{0.50}$.
U: $\mathbf{0.30}$, $\mathbf{0.60}$ and $\mathbf{0.80}$.

Question 2 Which pens are in U

U has spots at 0.30, 0.60 and 0.80. Pens **P and Q** together give exactly these R_f values. R has 0.50, which does not appear in U, so R is not in U.

Question 3 Shared dye

The spot at $R_f = \mathbf{0.30}$ is shared. In the same solvent a substance has a fixed R_f , so P and Q contain the **same dye** in this spot.

Question 4 Is R pure

No. One spot is **consistent with a single dye** but two dyes can have the same R_f in one solvent. Run R in a **second solvent** and see if it still gives only one spot.

Question 5 Pencil baseline

Pencil lead is insoluble, so it does not move. If the baseline were under the water, the ink would **dissolve into the beaker** instead of travelling up the paper.

Question 6 Marking the front

The solvent evaporates from the paper, so the front would be lost. The front distance is needed for $R_f = \mathbf{\text{distance of spot} \div \text{distance of front}}$.

Question 7 Effect of a different solvent

The R_f values would **change** because the dyes dissolve differently, but the same dyes would still travel the same relative order, so the conclusion about which dyes are in U would stay

the same if all strips used the same new solvent.

Question 8 Improve reliability

Repeat each strip **three times** and use mean R_f values, and measure to the **centre of each spot** using the same method each time. Use strips cut from the same sheet of paper.