

# 2023 Ch H1 Q16

Section: Researching Chemistry

Topic: Chromatography

## Question Summary

A chemist analysed a mixture of four dyes (A, B, C, D) using gas-liquid chromatography. Retention time increases with increasing polarity of the dye. The chromatogram shows peak Z with the longest retention time. Which structure corresponds to dye Z?

## Worked Solution

The retention time in chromatography depends on polarity: • More polar molecules interact more strongly with the stationary phase, so they take longer to pass through the column.

Looking at the dye structures: • The dye with the greatest number of -OH groups will be the most polar, as hydroxyl groups form strong hydrogen bonds.

Dye D has the most -OH groups compared

to A, B, and C, so it is the most polar.

## **Final Answer**

**D — Dye D (most -OH groups, longest retention time)**

## **Revision Tips**

- In chromatography, greater polarity = longer retention time (for polar stationary phases).
- Hydroxyl groups (-OH) strongly increase polarity.
- Always compare functional groups when predicting chromatographic behaviour.