Oxford Cambridge and RSA

A level Chemistry A

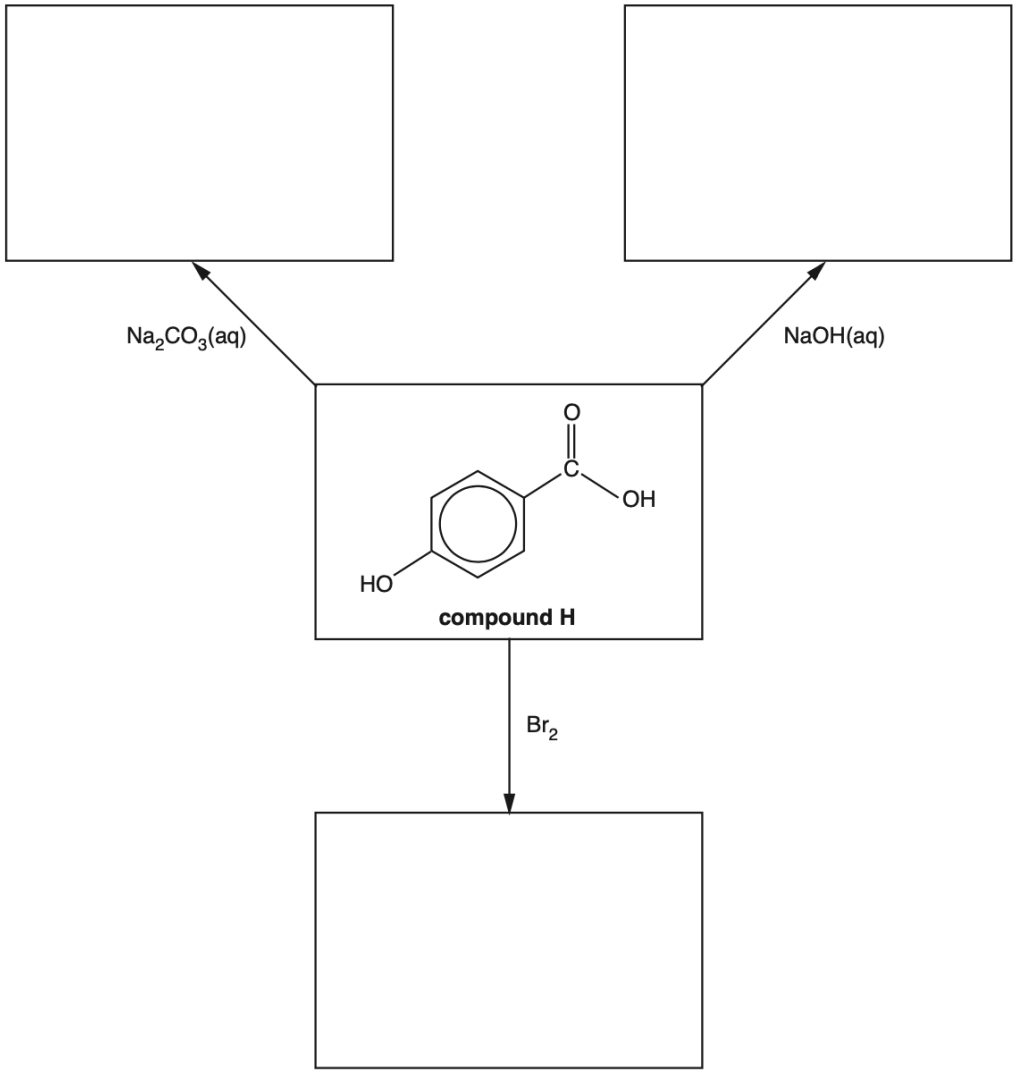
H432/02 Synthesis and analytical techniques

Question Set 19

1. This question is about aromatic carboxylic acids and their derivatives.

(a) The flowchart below shows some reactions of compound **H**.

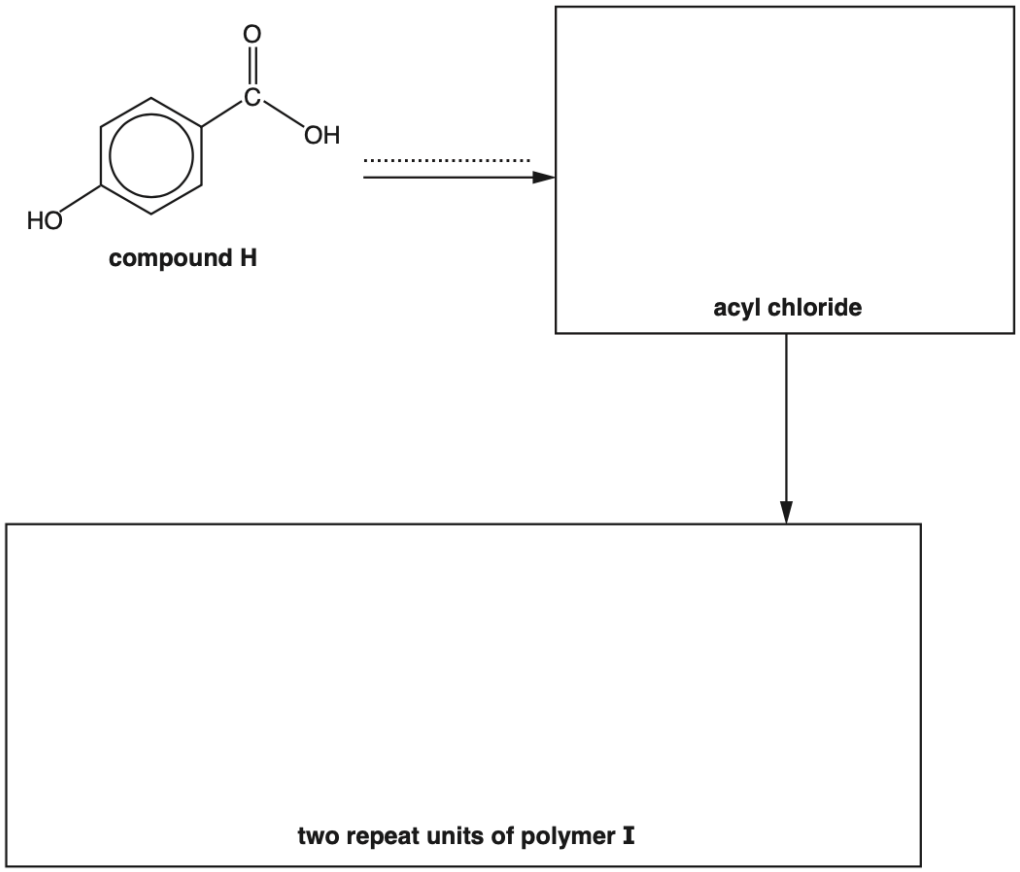
In the boxes, draw the organic products of these reactions.



[3]

(b) Compound **H** is used in the synthesis of polymer **I**, as shown in the flowchart below.

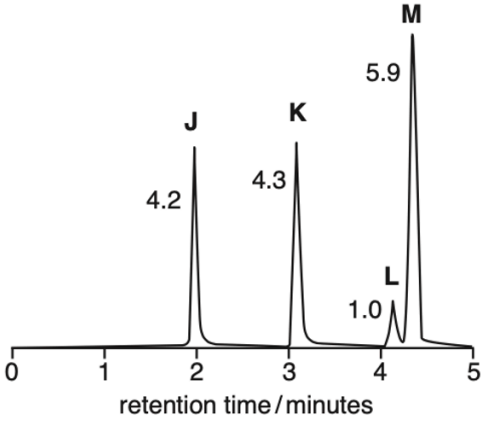
Complete the flowchart by drawing the structure of the acyl chloride and **two** repeat units of polymer **I**, and stating the **formula** of the reagent(s) required for the first stage on the dotted line.



[4]

(c) A cosmetic product containing four esters, **J**, **K**, **L** and **M**, is analysed by gas chromatography and mass spectrometry. The results are shown below.

Gas chromatogram



The numbers by the peaks are the relative molar proportions of the compounds in the mixture.

Mass spectroscopy

ester	*m*/*z* of molecular ion peak
J	152
K	166
L	180
M	180

(i) The concentration of ester **K** in the cosmetic product is 9.13×10^{-2} g dm^{-3}.

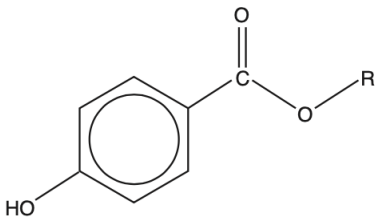
Using the results, calculate the concentration, in mol dm^{-3}, of ester **M** in the cosmetic product.

Give your answer to **two** significant figures.

concentration of ester **M** = ... mol dm^{-3}

[2]

(d) A general structure for esters **J**, **L** and **M** is shown below.



Where 'R' is an alkyl group.

Use the mass spectrometry results to deduce possible structures for esters **J**, **L** and **M**.

[3]

Total Marks for Question Set 19: 12