

Past-paper walk-through

Phenol ■ 32.2

eXercise

Questions in this set

- 9701/44 N25 Q7 ■ 9 marks

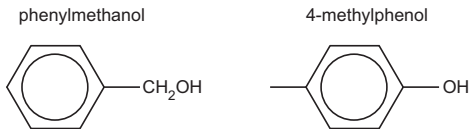
Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 7

9701/44 N25 ■ Q7 ■ 9 marks

- 7 Phenylmethanol and 4-methylphenol are isomers.



- (a) Complete Table 7.1 to show the relative acidities of benzoic acid ($\text{C}_6\text{H}_5\text{COOH}$), phenylmethanol, 4-methylphenol and water.

Explain your answer.

Table 7.1

name of compound

Question 7

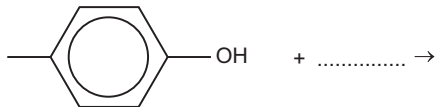
	name of compound
most acidic	
least acidic	

Question 7

[4]

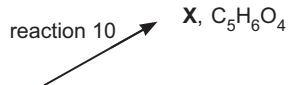
- (b) 4-methylphenol reacts readily with sodium.

Complete the equation for this reaction.



r11

- (c) Under certain conditions, ethane-1,2-diol, $\text{HOCH}_2\text{CH}_2\text{OH}$, reacts with propane-1,3-dioic acid, $\text{HOOCCH}_2\text{COOH}$, to form different organic products, as shown in Fig. 7.1.



Question 7

|| || $\perp$ π $\searrow$ $\wedge$

Question 7

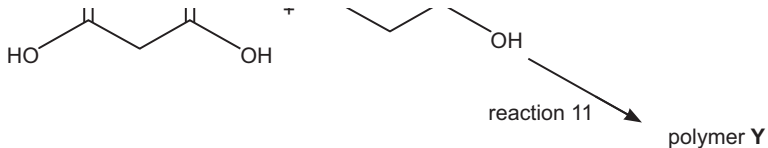


Fig. 7.1

- (i) **X** does **not** react with Na metal.

Draw the structure of the organic product **X**, $\text{C}_5\text{H}_6\text{O}_4$, shown in Fig. 7.1.

Question 7

[1]

- (ii) Reactions 10 and 11 in Fig. 7.1 are different types of reaction.

Name the type of reaction for reaction 10 and for reaction 11.

Question 7

[1]

(iii) Draw a section of polymer **Y** showing only **one** repeat unit.

The new functional group formed should be displayed.

Question 7

[2]

Total: 91 -

Solution 7

(a) Mark scheme

- M1:
- (most acidic) benzoic acid
- 4-methylphenol
- water
- (least acidic) phenylmethanol
- M2: correct link of acidity to
- weakens O—H / H^+ more easily lost / anion stabilised / conjugate base stabilised **M3**

Solution 7

- and M4: any two [2]
- ■
- for benzoic acid: negative inductive effect of C=O / electronegative C=O / two electronegative O / -ve charge delocalised
- (across two O) / resonance in -COO-
- ■
- for 4-methylphenol: as lone pair on oxygen delocalised into the ring / π system / delocalised system
- OR p orbital on oxygen overlaps with ring / π system / delocalised system
- ■
- for phenylmethanol: positive inductive effect of alkyl group / R / CH₂

Solution 7

■ 4

Solution 7

(b)

Mark scheme

■ 1

Solution 7

(c)(i)

Mark scheme

■ 1

Solution 7

(c)(ii)

Mark scheme

- (reaction 10) addition–elimination / condensation / esterification
- AND
- (reaction 11) addition–elimination / condensation (polymerisation) / esterification
- 1
- 9701/44
- October/November 2025

Solution 7

(c)(iii)

Mark scheme

- M1: ester linkage shown
- M2: rest of the structure correct with continuation bonds
- 2