

A level Chemistry B

H433/03 Practical skills in chemistry

Question Set 10

- 1 (a) A pair of chemistry students are asked to prepare a sample of paracetamol.

They use the reaction shown in **Fig. 1.1**.

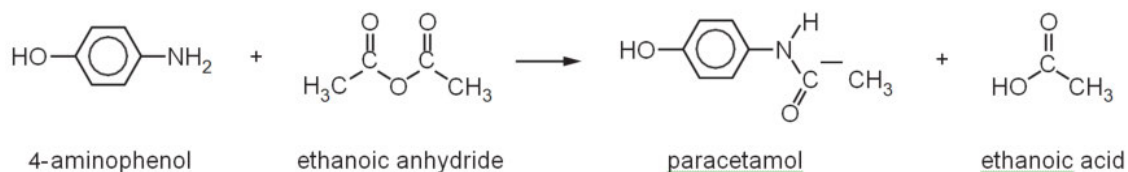


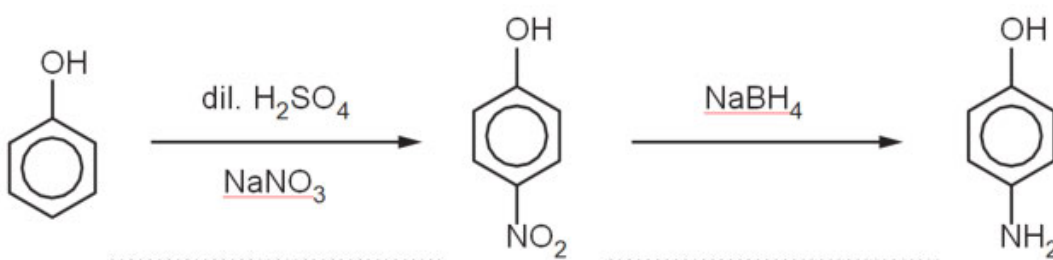
Fig. 1.1

Identify the **two** functional groups in paracetamol, apart from the benzene ring.

- 1.....
2

[2
]

- 1 (b) The reactant 4-aminophenol can be made from phenol in the two-step synthesis shown below.



Name the **type** of reaction for each step.

[2
]

- 1 (c) **Fig. 1.2** shows some information found on a bottle of ethanoic anhydride. The students use the information in **Fig. 1.2** to write a risk assessment for ethanoic anhydride

Ethanoic anhydride	Hazards
	Flammable
	Harmful by inhalation and if swallowed
	Corrosive – causes burns

Fig 1.2

Suggest **three** precautions that the students should take when using ethanoic anhydride.

- 1.....
2

[3
]

- 1 (d) The mechanism for the reaction for the formation of paracetamol is shown in **Fig. 1.3**

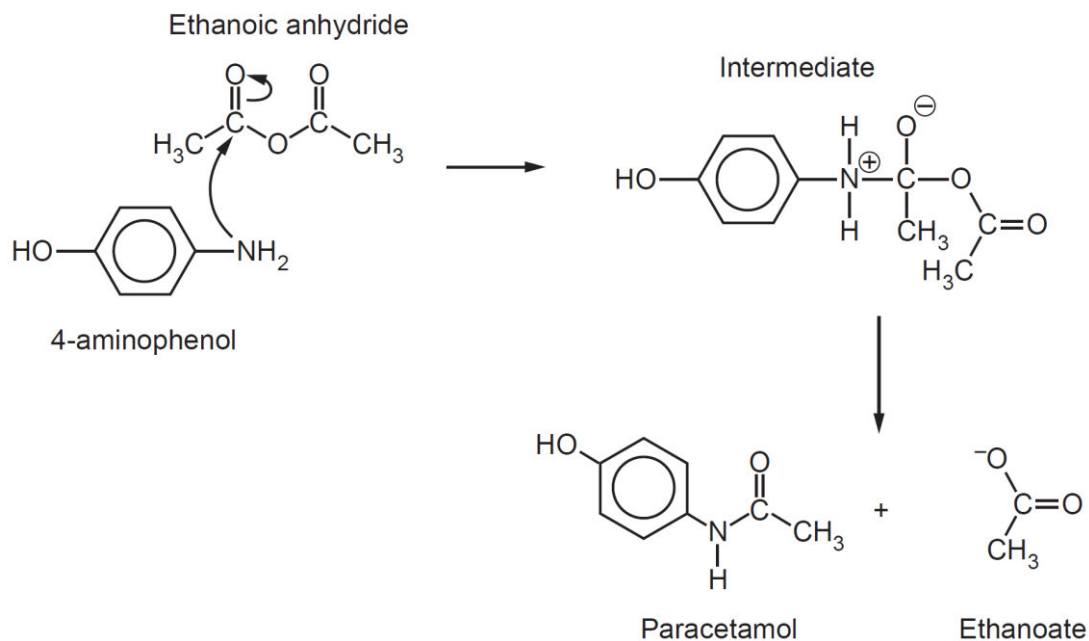


Fig. 1.3.

Mark curly arrows to show the electron movements that occur in the **intermediate** to allow formation of the products in **Fig. 1.3**. [1]

- 1 (e) (i) The students carry out the preparation using water as solvent. Paracetamol is insoluble in water.

The students use the apparatus in **Fig. 1.4** to separate the paracetamol from the reaction mixture.

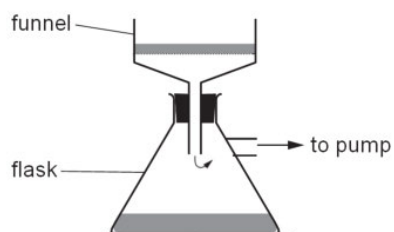


Fig. 1.4

Name the technique in **Fig. 1.4** and explain how this apparatus is used to get a sample of impure solid paracetamol. [3]

1 (e) (ii) Suggest a reason for using the technique in **Fig. 1.4** rather than simple filtration [1]

1 (f) **Fig. 1.1** is repeated below.

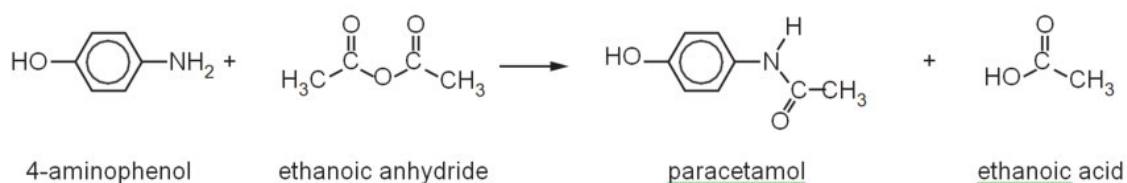


Fig. 1.1

The students then recrystallised their paracetamol sample.

The students started with a mass of 2.1 g of 4-aminophenol and used excess ethanoic anhydride.

The mass of dried recrystallised paracetamol produced was 1.5 g.

Calculate the percentage yield for the students' reaction.

Give your answer to an **appropriate** number of significant figures.

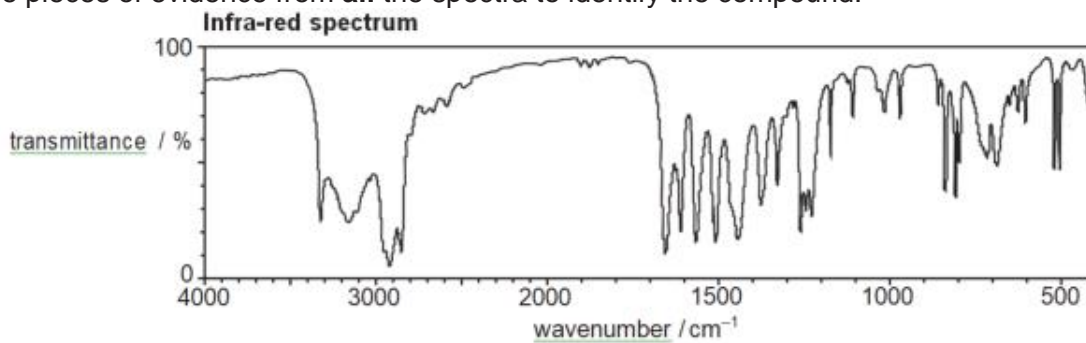
percentage yield = %

[3]

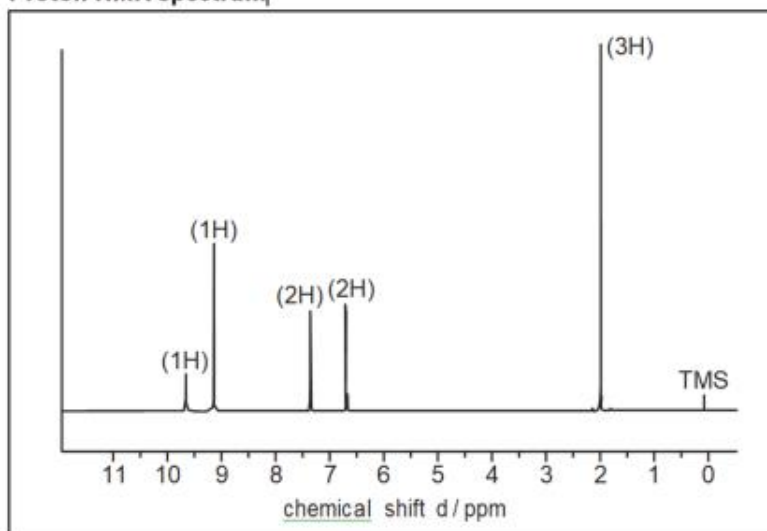
- 1 (g) The students sent pure samples of their reagents and products to a university lab. Spectra of all the compounds were produced.

The spectra from **one** of the compounds are shown below.

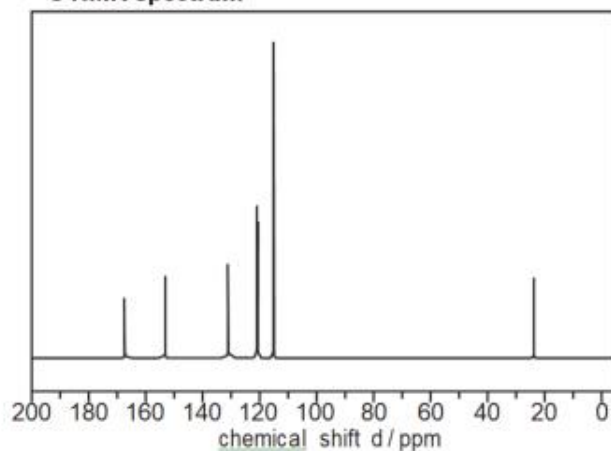
Use pieces of evidence from **all** the spectra to identify the compound.



Proton NMR spectrum



^{13}C NMR spectrum



- 1 (h) (i) The mass spectrum of ethanoic acid is shown below.

© National Institute of Standards and Technology,
webbook11@nist.gov. Item removed due to third party copyright
restrictions. Link to material: [https://webbook.nist.gov/cgi/cbook.cgi?
Spec=C64197&Index=0&Type=Mass&Large=on](https://webbook.nist.gov/cgi/cbook.cgi?Spec=C64197&Index=0&Type=Mass&Large=on)

Give the structures that produce the peaks at:

60.....

.

43.....

.

[2
]

- 1 (h) (ii) Suggest why there is a small peak at 61.

[1
]

Total Marks for Question Set 10 = 24

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge