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Answers

Practice exam questions

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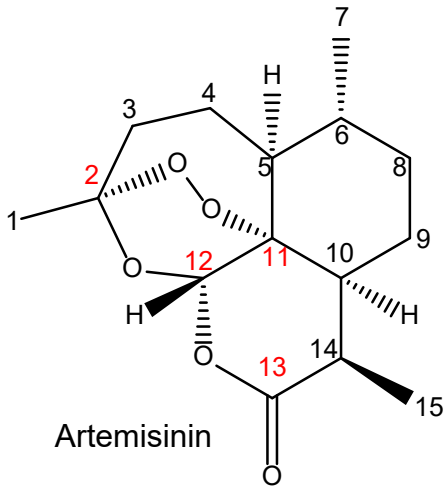
Check your answers to the questions in this issue.

Artemisinin: a valuable but limited antimalarial resource (pp. 2–7)

1 The artemisinin molecule has the formula $C_{15}H_{22}O_5$. All 15 carbons have different environments to each other (i.e. there are no equivalent carbons), so there are 15 peaks in the spectrum.

2



Artemisinin

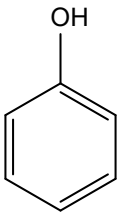
a The most downfield peak, at 172.46 ppm, is due to the C=O group (carbon 13 in the structure above).

b There are three other carbon atoms (labelled 2, 11 and 12 in the structure above) next to very electronegative oxygens, which will shift their signals downfield too. Carbons 2 and 12 are in fact bound to two oxygens, so are likely to be shifted the most (as is the case) to 105.78 and 94.11 ppm, respectively.

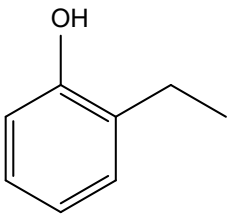
c Carbon 11 corresponds to 79.90 ppm.

Sniffing out cancer (pp. 8–11)

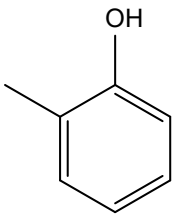
1



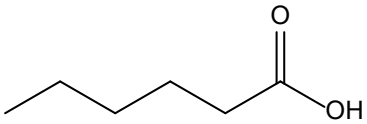
Phenol



Ethylphenol *



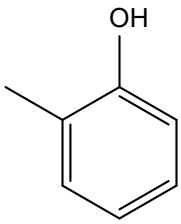
Methylphenol *



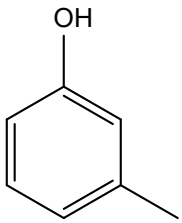
Hexanoic acid

* Note that other positional isomers are acceptable

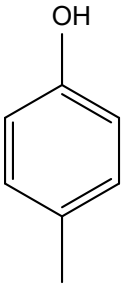
2



2-Methylphenol



3-Methylphenol



4-Methylphenol

3

Compound	Relative molecular mass
Ethylphenol	(8 × 12) + (10 × 1) + 16 = 122
Methylphenol	(7 × 12) + (8 × 1) + 16 = 108
Phenol	(6 × 12) + (6 × 1) + 16 = 94
Hexanoic acid	(6 × 12) + (12 × 1) + (2 × 16) = 116