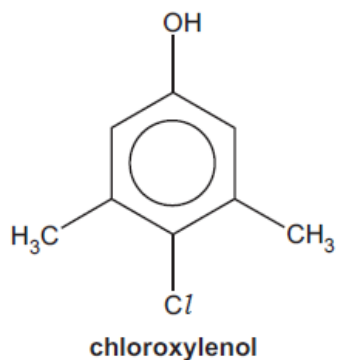


**A Level Chemistry A**  
**H432/03** Unified chemistry

**Question Set 15**

1

Dettol<sup>®</sup> is a disinfectant containing the antiseptic chloroxylenol, shown below.



- (a) Chloroxylenol is a weak Brønsted–Lowry acid.
- (i) What is the systematic name of chloroxylenol? [1]
- (ii) Predict the number of peaks in a <sup>13</sup>C NMR spectrum of chloroxylenol. [1]
- (iii) Name the functional group responsible for the acidity of chloroxylenol and describe a simple test which would confirm the presence of this group. [2]
- (iv) A student measures the pH of the contents in a bottle of Dettol<sup>®</sup> as 5.14.

The label on the bottle shows the percentage of chloroxylenol in Dettol<sup>®</sup> as 4.80%. i.e. 100 cm<sup>3</sup> of Dettol<sup>®</sup> contains 4.80 g of chloroxylenol.

Assume the following:

- Chloroxylenol is the only acidic component in Dettol<sup>®</sup>.
- Chloroxylenol is a weak monobasic acid.
- The density of Dettol<sup>®</sup> is 1.00 g cm<sup>-3</sup>.

Write the equation, using molecular formulae, for the acid dissociation of chloroxylenol.

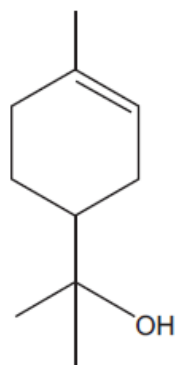
Calculate the acid dissociation constant,  $K_a$ , in kJ mol<sup>-1</sup>, for chloroxylenol.

$K_a = \dots\dots\dots \text{mol dm}^{-3}$  [5]

(b) Dettol® contains other chemicals including  $\alpha$ -terpineol, shown below.

(c) (i)  $\alpha$ -Terpineol is a chiral compound.

Show with an asterisk, (\*), the chiral centre(s) in the structure of  $\alpha$ -terpineol.



$\alpha$ -terpineol

[1]

(ii)  $\alpha$ -Terpineol meets the requirements for *E/Z* isomerism. However, only one *E/Z* isomer of  $\alpha$ -terpineol exists.

Explain

- why  $\alpha$ -terpineol meets the requirements for *E/Z* isomerism
- whether  $\alpha$ -terpineol is an *E*- or *Z*- isomer
- why only one *E/Z* isomer of  $\alpha$ -terpineol exists.

[4]

(iii)  $\alpha$ -Terpineol contains two functional groups.

For each functional group, choose a reagent that reacts with that group **only**. Draw the structures for the organic products of the reactions.

Show structures for organic compounds.

[4]

**Total Marks for Question Set 15: 18**

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