Alcohols Practice Test

Mr Cole Chemistry

Name ..... Class: .....

Start Time ..... End Time ..... Time Taken .....

Time allowed: 45 minutes

INSTRUCTIONS TO CANDIDATES

- This document is designed to be used as a practice test.
- Complete the test under exam conditions in one sitting.
- Mark the test using the mark scheme make corrections on the paper.
- Complete the table on the front page.
- Use this as an opportunity to determine what you do and do not know on the topic.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets at the end of each question or part of a question.
- The marks allocated and the spaces provided for your answers are a good indication of the length of answers required.
- You may use a data book.

Mark Scheme

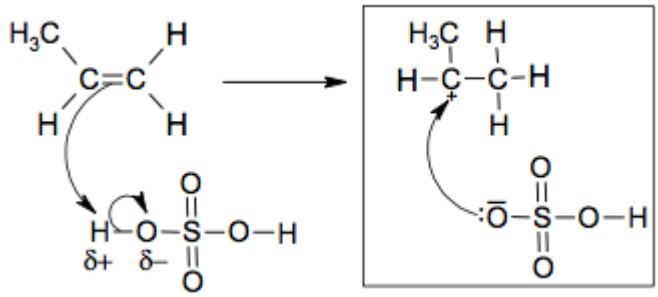
Success Criteria	Questions in Paper	Mark	Out of	%	Rank Order
Forming alcohols – hydration	1a		7		
Forming alcohols – various methods	1b, 7		7		
Oxidation – practical techniques	2a, 2c, 2d		10		
Oxidation – theory	2b, 4b, 4g, 6, 8, 10				
Elimination	3a, 4c, 4d, 4h, 5, 9				
Nomenclature	4a, 4e		2		
Boiling points	4f		1		
Total			43		

Mark schemes

Q1.

(a) Electrophilic addition

1



M2 = curly arrow from C=C towards H of H−O on 'their' sulfuric acid

M3 = curly arrow to break H−O

Penalise incorrect dipole/full charges

M4 = intermediate

M5 = correct anion, lone pair on correct O and curly arrow from that lone pair to C+ on their carbocation

***IGNORE** position of minus sign unless displayed structure*

***IGNORE** product*

1
1
1
1

Major product/propan-2-ol formed via most stable carbocation/carbonium ion

secondary carbocation/carbonium ion more stable (than primary)

or reverse argument

M6 for idea of carbocation stability

This statement gets M6 and M7

***NOT** stability of alcohols*

1
1

(b) Hot/High T (and High P)

***ALLOW** 200-450 C/473-723 K (Quoted)*

1

(SiO_2 coated in) phosphoric acid (catalyst)

***NOT** (aq)*

1

advantages of fermentation

- Low(er) T and P / lower energy use
- Less use of non-renewable fossil fuels/renewable/sustainable (resources)

- Low(er) equipment/plant/capital costs
  IGNORE *carbon neutral*
  max 2

1
1

Disadvantages of fermentation

- Slow(er) reaction
- Low atom economy
- Impure product/extra purification/distillation required
- Batch process/labour intensive/difficult to automate
- Land used for sugar crops (so not available for food crops)
  IGNORE *low yield*
  Max 2

1
1

[13]

Q2.

(a) A mixture of liquids is heated to boiling point for a prolonged time

1

Vapour is formed which escapes from the liquid mixture, is changed back into liquid and returned to the liquid mixture

1

Any ethanal and ethanol that initially evaporates can then be oxidised

1

(b) $CH_3CH_2OH + H_2O \longrightarrow CH_3COOH + 4H^+ + 4e^-$

1

(c) Mixture heated in a suitable flask / container
A labelled sketch illustrating these points scores the marks

1

With still head containing a thermometer

1

Water cooled condenser connected to the still head and suitable <u>cooled</u> collecting vessel

1

Collect sample at the boiling point of ethanal

1

Cooled collection vessel necessary to reduce evaporation of ethanal

1

(d) Hydrogen bonding in ethanol and ethanoic acid or no hydrogen bonding in ethanal

1

Intermolecular forces / dipole-dipole are weaker than hydrogen bonding

1

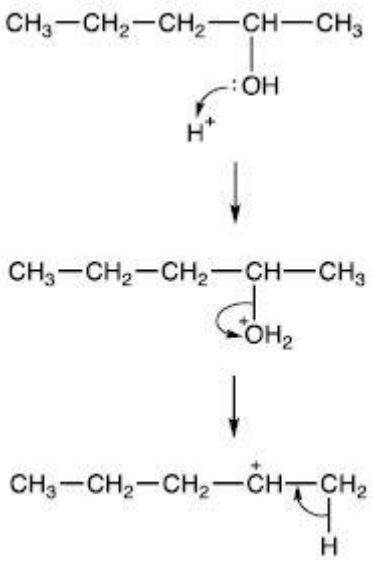
Q3.

(a) **M1** reagent = conc sulfuric acid or conc phosphoric acid

M1 *penalise incorrect name or formula (even if both name and formula are given)*

1

M2 condition = hot / temperature in range 150-200°(C)



M2 *allow high temperature*

M2 *reagent must indicate an acid in some way in order for* ***M2*** *to be awarded*

M1/2 *allow 1 mark if* H_2SO_4/H_3PO_4 *given as reagent and conc(entrated) given as condition*

1

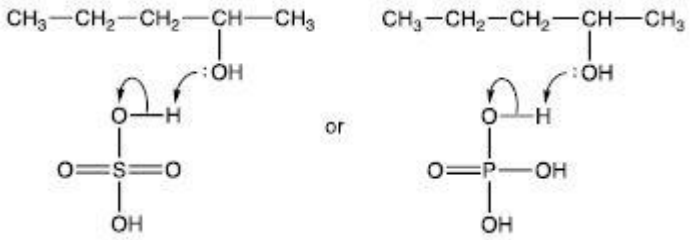
M3 curly arrow from lone pair on alcohol O to H^+

M3-5

penalise ***M3/4/5*** *for any additional arrow(s) in addition to the correct one at each stage*

If incorrect reactant (or product if shown), maximum 2 marks of ***M3-5***

Alternatives for M3



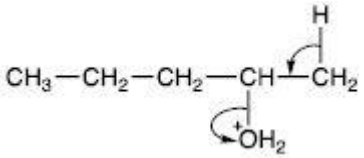
1

M4 curly arrow from C-O bond to O on correct intermediate

1

M5 arrow from C-H bond on C1 to C-C bond between C1 and C2 on correct carbocation

*allow **M4** and **M5** concurrent:*



1

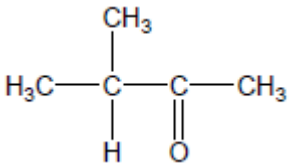
[8]

Q4.

(a) 3-methylbutan-2-ol

1

(b)



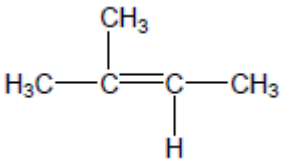
Allow $(CH_3)_2CHCOCH_3$

1

(c) Elimination

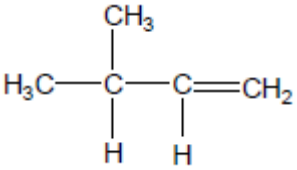
1

(d)



Allow $(CH_3)_2C=CHCH_3$

1



Allow $(CH_3)_2CHCH=CH_2$

1

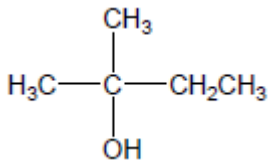
(e) Position

1

(f) C B A

1

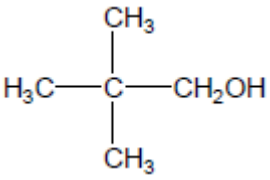
(g)



Allow $(CH_3)_2C(OH)CH_2CH_3$

1

(h)



Allow $(CH_3)_3CCH_2OH$

1

[9]

Q5.

D

pentan-2-ol

[1]

Q6.

D

3-methylbutan-2-ol

[1]

Q7.

B

CH_3COOCH_3 and NaOH(aq)

[1]

Q8.

B

[1]

Q9.

D

[1]

Q10.

D

3-methylbutan-2-ol

[1]