



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2014**

Chemistry

Assessment Unit AS 2

assessing

**Module 2: Organic, Physical
and Inorganic Chemistry**

[AC122]

TUESDAY 17 JUNE, AFTERNOON

**MARK
SCHEME**

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finished.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published; the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

Section A

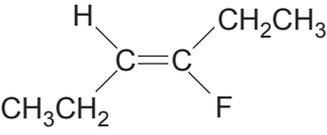
- 1 B
- 2 C
- 3 B
- 4 C
- 5 D
- 6 B
- 7 B
- 8 A
- 9 C
- 10 A

[2] for each correct answer

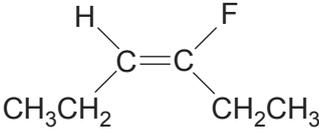
[20]
Section A

AVAILABLE MARKS	
	20
Section A	20

Section B

- 11 (a) (i)** % Yield = $\frac{\text{actual yield}}{\text{theoretical yield}} \times 100$ [1]
- (ii)** moles 1-bromobutane = $5.48/137 = 0.04$
 moles butan-1-ol = 0.1
 mass butan-1-ol = 7.4 g [3]
- (b) (i)** atom economy = $\frac{\text{mass of desired product}}{\text{total mass of products}} \times 100$ [1]
- (ii)** 88.4% [1]
- 12 (a) (i)** NaOH(aq)/NH₃(aq)/potassium thiocyanate
 – no change with Fe(II) ions
 blood red solution with Fe(III) ions [1]
- Green precipitate with iron(II)
 Rust/brown precipitate with iron(III) [2]
- (ii)** NH₃(aq) [1]
- White precipitate with zinc (ions) soluble in excess
 White precipitate with aluminium (ions) insoluble in excess [2]
- (b) (i)** yellow precipitate [1]
- (ii)** $\text{Ba}^{2+}(\text{aq}) + \text{CrO}_4^{2-}(\text{aq}) \rightarrow \text{BaCrO}_4(\text{s})$ [2]
- 13 (a)** 3-fluorohex-3-ene [2]
- (b) (i)**
- 

Z isomer



E isomer
- [1]
- (ii)** Two highest priority groups are on the same side of C=C
 C of ethyl group has higher priority than H
 F has higher priority than C of ethyl group [3]
- Quality of written communication [2]
- (c) (i)** a correct structure, e.g. 2-fluorohex-1-ene [1]
- (ii)** One of the carbons in the C=C bond has two identical atoms/groups attached [2]

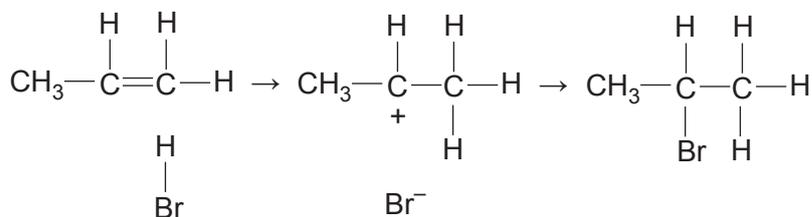
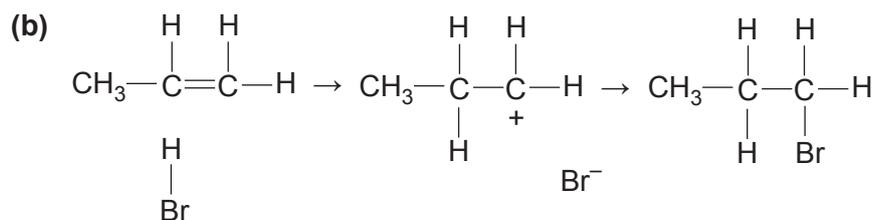
AVAILABLE
MARKS

6

9

11

- 14 (a) C=C/propene is a centre of high electron density
H end of HBr has a partial positive charge [2]



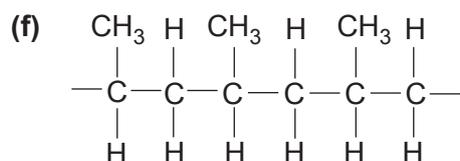
[4]

- (c) (i) (fractional) distillation [1]

- (ii) compare unknown spectra with spectra of each isomer [1]

- (d) intermediate is (more) stable [1]

- (e) electrophilic addition [1]



[2]

12

- 15 (a) the volume of one mole of gas
under specified conditions of temperature and pressure [2]

- (b) (i) total moles of gases = 300
moles of CO = 200 [2]

- (ii) 400 [1]

- (iii) moles of propane = 100
mass of propane = 4400g
mass of propane = 4.4kg [3]

- (iv) 6.02×10^{25} [1]

- (c) $6 \text{CH}_4 + 11 \text{O}_2 \rightarrow 4 \text{CO}_2 + 2 \text{CO} + 12 \text{H}_2\text{O}$ [2]

11

- 16 (a)** moles of carbon dioxide = 22.7
 moles of butane = 5.68
 energy released = 16 344 (kJ) [3]
- (b) (i)** The enthalpy change when one mole of a compound is formed from its elements under standard conditions [3]
- (ii)** $4 \text{C(s)} + 5 \text{H}_2\text{(g)} \rightarrow \text{C}_4\text{H}_{10}\text{(g)}$ [2]
- (iii)** $[(4 \times -393.5) + (5 \times -285.8)] - [(-2876.5)] = -126.5 \text{ (kJ mol}^{-1}\text{)}$ [3]
- 17 (a)** ethane-1,2-diol [1]
- (b)** CH_3O [1]
- (c) (i)** steamy fumes
 goes warm
 hissing sound/bubbles
 changed smell [2]
- (ii)** esterification [1]
- (iii)**
- $$\begin{array}{ccccccc} & \text{H} & \text{O} & & \text{H} & \text{H} & & \text{O} & \text{H} \\ & | & || & & | & | & & || & | \\ \text{H} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{H} \\ & | & & & | & | & & & | \\ & \text{H} & & & \text{H} & \text{H} & & & \text{H} \end{array}$$
- [2]
- (iv)** glass rod dipped into conc. ammonia solution
 white smoke/fumes [2]
- (d) (i)** only one carbon directly attached to the same carbon as the —OH group [1]
- (ii)** oxidation [1]
- (iii)**
- $$\begin{array}{c} \text{O} \quad \quad \text{O} \\ // \quad \quad \backslash \\ \text{C} \quad - \quad \text{C} \\ \backslash \quad \quad / \\ \text{H}-\text{O} \quad \quad \text{O}-\text{H} \end{array}$$
- [1]
- (iv)** carboxyl [1]
- (v)** presence of $\text{C}=\text{O}$ absorption [1]
- (e)** $\text{C}_2\text{H}_6\text{O}_2 + 2\text{PCl}_5 \rightarrow \text{C}_2\text{H}_4\text{Cl}_2 + 2\text{POCl}_3 + 2\text{HCl}$ [2]
- (f)** Does not have an H and a methyl group attached to the same C as the OH [1]
- (g)** more OH groups in ethylene glycol
 more hydrogen bonding ethylene glycol
 more energy needed to break hydrogen bonds [3]

AVAILABLE
MARKS

11

Section B

80

Total

100