Chemistry

Staff members

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Saint Benedict Catholic Voluntary Academy-Sixth Form

Y12 and Y13

Module 1 – Practical skills

There are 12 assessed practicals that aim to develop the planning delivery and analysis of experiments.
Across both years, you will be assessed against these criteria.

Y12 content

Autumn
Module 2 – Foundations in chemistry
This includes looking at equations, amount of substance, acid-base reactions and bonding
Spring
Module 3 – Periodic table and energy
This covers the periodic table, the chemistry of group 2 and 7 elements and their compounds, enthalpy changes, equilibrium and reaction rates
Summer
Module 4 – Core organic chemistry
This covers hydrocarbons, alcohols, haloalkanes, organic synthesis and analytical techniques.

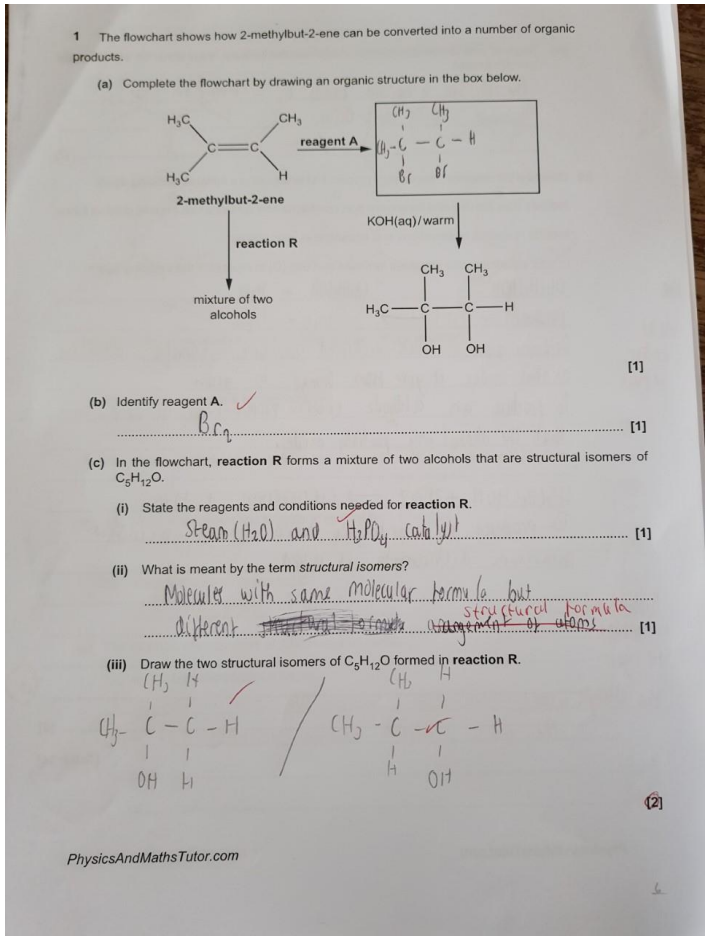
Y13 content

Autumn and Spring Terms
Module 5 - Physical chemistry and transition elements
This includes the quantitative approach to reaction rates and equilibrium, pH and buffers. Entropy, enthalpy and transition elements are also covered

Module 6 – Organic chemistry and analysis
This covers benzene chemistry, carbonyl compounds, nitrogen compounds and polymers. Chromatography and spectroscopy are also included.

Saint Benedict Catholic Voluntary Academy-Sixth Form

Examples of student work.



1 The flowchart shows how 2-methylbut-2-ene can be converted into a number of organic products.

(a) Complete the flowchart by drawing an organic structure in the box below.

2-methylbut-2-ene → reagent A → [ ] → KOH(aq)/warm → CH_3 CH_3 / H_3C–C–C–H / OH OH

2-methylbut-2-ene → reaction R → mixture of two alcohols

[1]

(b) Identify reagent A. ✓

Br_2 [1]

(c) In the flowchart, **reaction R** forms a mixture of two alcohols that are structural isomers of $C_5H_{12}O$.

(i) State the reagents and conditions needed for **reaction R**.

Steam (H_2O) and H_3PO_4 catalyst [1]

(ii) What is meant by the term *structural isomers*?

Molecules with same molecular formula but different structural formula arrangement of atoms [1]

(iii) Draw the two structural isomers of $C_5H_{12}O$ formed in **reaction R**.

CH_3 H / CH_3–C–C–H / OH H

CH_3 H / CH_3–C–C–H / H OH

[2]

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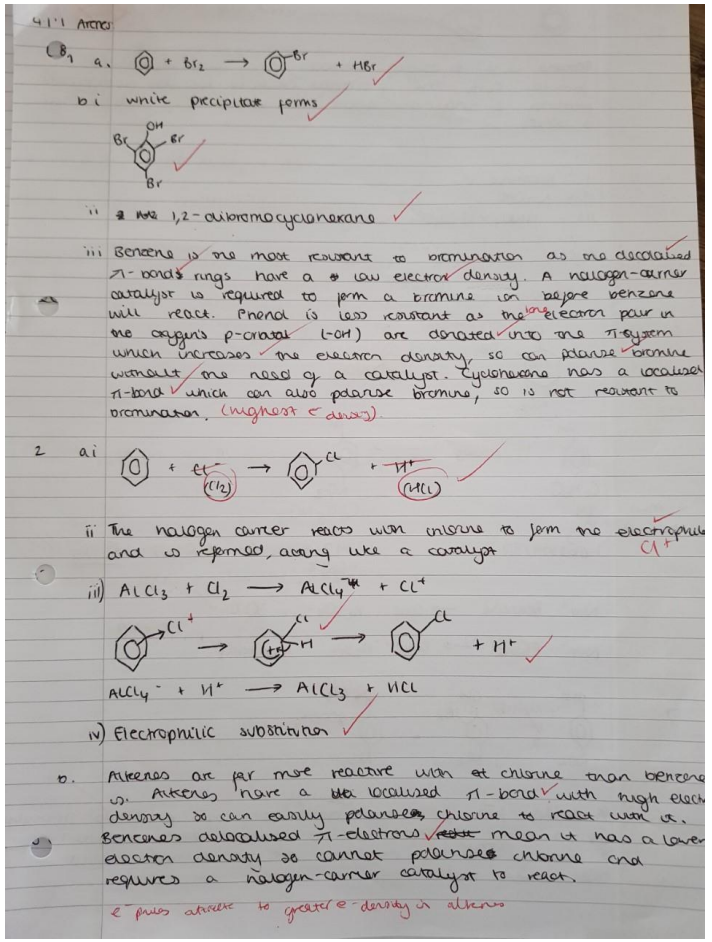


4.1.1 Arenes

6 a. $C_6H_6 + Br_2 \rightarrow C_6H_5Br + HBr$

b i white precipitate forms

ii 1,2-dibromocyclohexane

iii Benzene is the most resistant to bromination as the delocalised π-bonds rings have a low electron density. A halogen-carrier catalyst is required to form a bromine ion before benzene will react. Phenol is less resistant as the lone electron pair in the oxygen's p-orbital (-OH) are donated into the π-system which increases the electron density, so can polarise bromine without the need of a catalyst. Cyclohexene has a localised π-bond which can also polarise bromine, so is not resistant to bromination. (highest e⁻ density)

2 ai $C_6H_6 + Cl^+ \rightarrow C_6H_5Cl + H^+$ (Cl_2) (HCl)

ii The halogen carrier reacts with chlorine to form the electrophile Cl^+ and is regained, acting like a catalyst

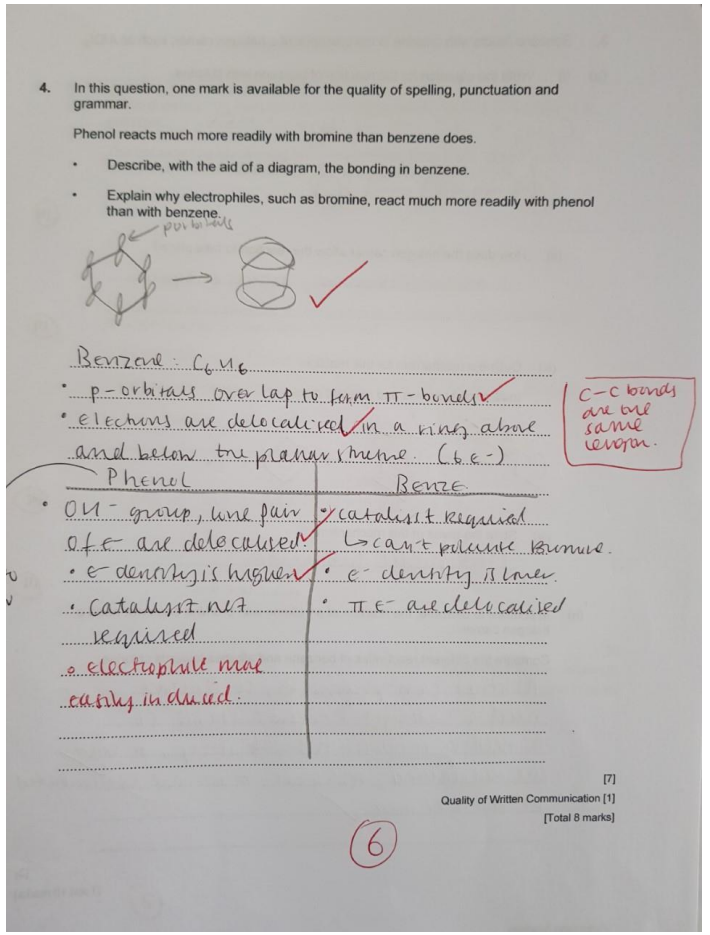
iii $AlCl_3 + Cl_2 \rightarrow AlCl_4^- + Cl^+$

$AlCl_4^- + H^+ \rightarrow AlCl_3 + HCl$

iv) Electrophilic substitution

b. Alkenes are far more reactive with or chlorine than benzene is. Alkenes have a localised π-bond with high electron density so can easily polarise chlorine to react with it. Benzenes delocalised π-electrons mean it has a lower electron density so cannot polarise chlorine and requires a halogen-carrier catalyst to react.

e⁻ pairs attracted to greater e⁻ density in alkenes



4. In this question, one mark is available for the quality of spelling, punctuation and grammar.

Phenol reacts much more readily with bromine than benzene does.

- Describe, with the aid of a diagram, the bonding in benzene.
- Explain why electrophiles, such as bromine, react much more readily with phenol than with benzene.

Benzene: C_6H_6

- p-orbitals overlap to form π-bonds ✓
- electrons are delocalised in a ring above and below the planar structure (6 e⁻)

C–C bonds are the same length.

Phenol	Benzene
OH group, lone pair of e⁻ are delocalised ✓	catalyst required ✓
e⁻ density is higher ✓	e⁻ density is lower
catalyst not required	π e⁻ are delocalised
electrophile more easily induced	

[7]

Quality of Written Communication [1]

[Total 8 marks]

6

Exam board: OCR Chemistry A

Paper	Marks	Duration	Weighting (%)
1. Periodic table, elements and physical chemistry	100	2 hours and 15 minutes	37
2. Synthesis and analytical techniques	100	2 hours and 15 minutes	37
3. Unified chemistry	70	1 hour and 30 minutes	26

Entry requirements

Chemistry (separate science)	Grade 6 or above
Combined science	Grade 6-6 or above
Maths	Grade 6 or above
English Language/Literature	Grade 4 or above

A Career with an A-Level in Chemistry. What can it lead too?

It's a very long list … medicine, pharmacy, veterinary science, chemistry, biochemistry, food science/nutrition, forensic science, biological/engineering careers, optometry, microbiology, natural sciences, pharmacology, software engineering, physiology, food technology, nursing, physiotherapy, radiography, paramedical courses, law and zoology.

Thank you for visiting Chemistry.
If you have any questions, please contact

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