

Chemistry

Time Allowed – 1.5 hours

Answer TWO questions from the choice of four given below

All questions are equally weighted

A periodic table is provided and a calculator may be used

- Ethanol can be produced by two different industrial methods. Write balanced equations and describe the production of ethanol from glucose and from ethene. Currently, ethanol is largely produced from ethene. Explain why this is the case and why this may change in the future.
- Polluted air above a city is found to contain 5×10^{-10} moles of SO_2 per litre of air.
 - Express the concentration of SO_2 as number of molecules per litre of air.
 - Write a balanced equation for the reaction between SO_2 and oxygen gas (O_2) that leads to formation of SO_3 .
 - Explain the environmental significance of the reaction equation that you have written.
- Write an essay on chirality giving examples of why it is important in living organisms.
- Reaction of **Compound A** with **Compound B** yielded an **ester, C**. Samples of **A** and **B** were analysed by Infrared Spectroscopy and Mass spectrometry. The results are provided below:

Analysis of Compound A

Type of Analysis	Evidence
Infrared spectroscopy	Absorption at 1720 cm^{-1} and a very broad absorption at $2500\text{-}3300 \text{ cm}^{-1}$
Mass spectrometry	Molecular ion peak at m/z 74.0

See over

Analysis of Compound B

Type of Analysis	Evidence
Infrared spectroscopy	Absorption at 2800-3300 cm^{-1} and a very broad absorption at 3200-3500 cm^{-1}
Mass spectrometry	Molecular ion peak at m/z 46

Use the information provided in the tables above to identify compounds **A**, **B** and **C**. Give a clear explanation and evidence for the identity of the three compounds.