



NATIONAL  
SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2020

PHYSICAL SCIENCES P2  
(CHEMISTRY)  
EXEMPLAR

MARKS: 100  
TIME: 1 hour



The question paper consists of 10 pages, including 4 extra sheets.  
Use blue or black ink for writing. Do not use correction fluid.

# QUESTION 3

## PHYSICAL SCIENCES PAPER 2 INTERMOLECULAR FORCES

**GRADE 11**

**NOVEMBER 2020**

Examiner's use: \_\_\_\_\_ Physical Sciences P2 \_\_\_\_\_

QUESTION 3 starts on a NEW page.

3.1 The boiling points in the table below were obtained during an investigation carried out to measure the boiling points of pure 1-hexanol. The table also lists the  $\Delta H_{\text{vap}}$  and  $\Delta H_{\text{fusion}}$  for 1-hexanol in kJ mol<sup>-1</sup> and 1 mol of 1-hexanol.

Compound	Molecular mass (M <sub>r</sub> )	Boiling point (°C)
A	102	16,2
B	102	21

- 3.1.1 Define the term boiling point. (2)
- 3.1.2 Is pure 1-hexanol composed of one (A) or two (B) and list one of its intermolecular forces? (2)
- 3.1.3 Name the type of intermolecular force that exists between molecules of both compounds A and B and its boiling point of these molecules. (2)
- 3.1.4 What (one) of the compounds (A or B) has a (threefold) greater mass (molar mass)? (2)
- 3.1.5 Which compound (A or B) will have the higher vapour pressure? (2)
- 3.1.6 Which compound (A or B) will have the higher surface tension? (2)

Compound B (M<sub>r</sub> 102) will show in the table, has a smaller molecular mass than both compounds A and B but has a relatively higher boiling point of 16,2 °C.

- 3.1.6 Explain why the boiling point of compound B is (lower) than that of compound A and B by referring to the  $\Delta H_{\text{vap}}$  and intermolecular or molecular forces involved. (2)

3.2 Substances C1 is added to water whereas 1-pentanol (substance C2) are added to hexane. See below the diagram that shows the structure of the diagram below.



- 3.2.1 Is substance C1 or C2, or both, able to hydrogen bond? (2)
- 3.2.2 Explain the process in QUESTION 3.1.1 about the boiling in the intermolecular forces involved. (2)

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