SASTRI COLLEGE
PHYSICAL SCIENCES
GRADE 12
PAPER 2

EXAMINER: R C JIVAN
TIME: 1 HOUR

MODERATOR: G PILLAY
MARKS: 50

INSTRUCTIONS AND INFORMATION.

1. Write your name on the top of your ANSWER PAGE.
2. Answer ALL the questions on your ANSWER PAGE.
3. You may use a non-programmable calculator.
4. You may use appropriate mathematical instruments.
5. Number the answers correctly according to the numbering system used in this question paper.
6. YOU ARE ADVISED TO USE THE ATTACHED DATA SHEETS.
7. Give brief motivations, discussions, et cetera where required.
8. Round off your final numerical answers to a minimum of TWO decimal places.

QUESTION 1 [START ON A NEW PAGE]

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Write only the letter (A–D) next to the question number on your ANSWER PAGE.

1.1 Which ONE of the following compounds belong to the same homologous series as propanoic acid?

A $CH_3CH_2CH_2COOH$

B $CH_3CH_2CH_2OH$

C CH_3COOCH_3

D CH_3CH_2CHO **(2)**

1.2 Which ONE of the following liquids will have the highest melting point?

A ethanol

B propan-1-ol

C butan-1-ol

D pentan-1-ol **(2)**

1.3 Consider the reaction represented by the equation below:

This reaction is an example of:

A hydrogenation

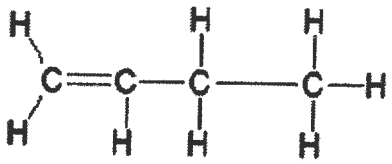
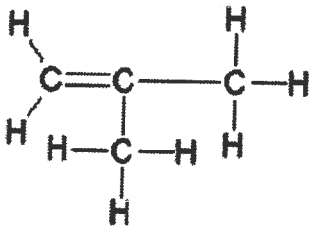
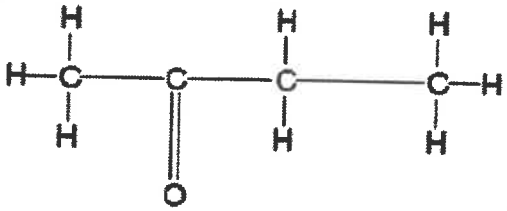
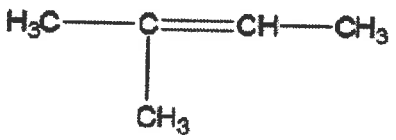
B halogenation

C hydrolysis

D hydration **(2)**

QUESTION 2 [START ON A NEW PAGE]

Consider the organic compounds represented by the letters A to G in the table below:

A 	**B** 	
C But-2-ene	**D** $CH_3CH_2CH_2COOH$	**E** Methyl propanoate
F 	**G** 	

2.1 Define the term hydrocarbon. (2)

2.2 Write down the LETTER that represents...

2.2.1 a chain isomer of compound A. (1)

2.2.2 a positional isomer of compound A. (1)

2.2.3 a functional isomer of compound D. (1)

2.3 Define the term structural isomer. (2)

2.4 Write down the IUPAC name of compound B. (2)

2.5 Write down the molecular formula of compound C. (1)

2.6 Write down the structural formula of compound E. (2)

2.7 Write down the structural formula for the functional group of compound C. (1)

2.8 Write down the IUPAC name of the compound that contains a carboxyl group. (1)

2.9 Is compound A SATURATED or UNSATURATED? Give a reason for your answer. (2)

2.10 Write down the name of the homologous series to which compound B belongs. (1)

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QUESTION 3 [START ON A NEW PAGE]

A learner conducts a scientific investigation to compare the boiling points of organic compounds belonging to different homologous series. Propan-1-ol, ethanoic acid and propanal are used for the investigation. His results are shown in the table below.

Compound	Boiling Point (°C)
Compound A	48
Compound B	97
Compound C	118

3.1 For this investigation, name the ...

3.1.1 independent variable. (1)

3.1.2 dependent variable. (1)

3.2 Will the vapour pressure of propanal be LOWER or HIGHER than the vapour pressure of propan-1-ol? Explain your answer by referring to the type of INTERMOLECULAR FORCES present and ENERGY. (4)

3.3 Identify:

3.3.1 Compound A (1)

3.3.2 Compound B (1)

3.3.3 Compound C (1)

3.4 Will the boiling point of butan-1-ol be HIGHER or LOWER than the boiling point of propan-1-ol? Explain the answer referring to the INTERMOLECULAR FORCES. (2)

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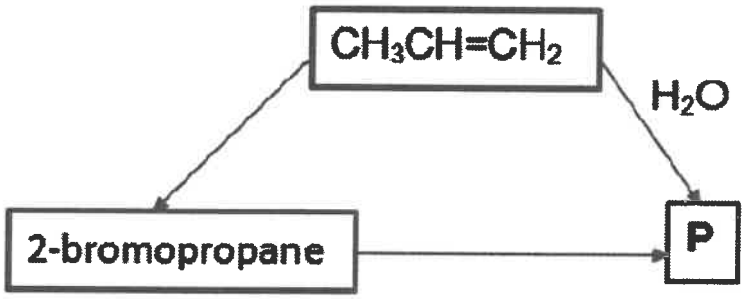
QUESTION 4 [START ON A NEW PAGE]

4.1 The flow diagram below shows the preparation of two organic compounds, using propene as one of the reactants.

4.1.1 Use structural formulae to write down a balanced chemical equation for the reaction between propene and water to produce compound P. (4)



4.1.2 Write down the IUPAC name of compound P. (1)

4.1.3 Compound P can also be obtained from 2-bromopropane.
Write down the:

(a) type of reaction that converts 2-bromopropane to P. (1)

(b) conditions under which the conversion can occur. (2)

4.2 A learner is preparing an ester using methanol (molecular formula: CH_4O) and ethanoic acid (molecular formula: $C_2H_4O_2$). The balanced chemical equation for this reaction is given below:

$$CH_4O + C_2H_4O_2 \rightarrow C_3H_6O_2 + H_2O$$

4.2.1 What type of reaction is represented by the equation above? (1)

4.2.2 Write down the NAME or FORMULA of the catalyst needed in this reaction. (1)

4.2.3 When 50 g of methanol fully reacts with excess ethanoic acid, it produces 68,88 g $C_3H_6O_2$. Calculate the percentage purity of the methanol. (5)

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TABLE 3: THE PERIODIC TABLE OF ELEMENTS
TABEL 3: DIE PERIODIEKE TABEL VAN ELEMENTE

1 (I)	2 (II)	3	4	5	6	7	8	9	10	11	12	13 (III)	14 (IV)	15 (V)	16 (VI)	17 (VII)	18 (VIII)
2,1 **H** 1																	**He** 4
1,0 **Li** 7	1,5 **Be** 9											2,0 **B** 11	2,5 **C** 12	3,0 **N** 14	3,5 **O** 16	4,0 **F** 19	**Ne** 20
0,9 **Na** 23	1,2 **Mg** 24											1,5 **Aℓ** 27	1,8 **Si** 28	2,1 **P** 31	2,5 **S** 32	3,0 **Cℓ** 35,5	**Ar** 40
0,8 **K** 39	1,0 **Ca** 40	1,3 **Sc** 45	1,5 **Ti** 48	1,6 **V** 51	1,6 **Cr** 52	1,5 **Mn** 55	1,8 **Fe** 56	1,8 **Co** 59	1,8 **Ni** 59	1,9 **Cu** 63,5	1,6 **Zn** 65	1,6 **Ga** 70	1,8 **Ge** 73	2,0 **As** 75	2,4 **Se** 79	2,8 **Br** 80	**Kr** 84
0,8 **Rb** 86	1,0 **Sr** 88	1,2 **Y** 89	1,4 **Zr** 91	**Nb** 92	1,8 **Mo** 96	1,9 **Tc**	2,2 **Ru** 101	2,2 **Rh** 103	2,2 **Pd** 106	1,9 **Ag** 108	1,7 **Cd** 112	1,7 **In** 115	1,8 **Sn** 119	1,9 **Sb** 122	2,1 **Te** 128	2,5 **I** 127	**Xe** 131
0,7 **Cs** 133	0,9 **Ba** 137	**La** 139	1,6 **Hf** 179	**Ta** 181	**W** 184	**Re** 186	**Os** 190	**Ir** 192	**Pt** 195	**Au** 197	**Hg** 201	1,8 **Tℓ** 204	1,8 **Pb** 207	1,9 **Bi** 209	2,0 **Po**	2,5 **At**	**Rn**
0,7 **Fr**	0,9 **Ra** 226	**Ac**															

58 **Ce** 140	59 **Pr** 141	60 **Nd** 144	61 **Pm**	62 **Sm** 150	63 **Eu** 152	64 **Gd** 157	65 **Tb** 159	66 **Dy** 163	67 **Ho** 165	68 **Er** 167	69 **Tm** 169	70 **Yb** 173	71 **Lu** 175
90 **Th** 232	91 **Pa**	92 **U** 238	93 **Np**	94 **Pu**	95 **Am**	96 **Cm**	97 **Bk**	98 **Cf**	99 **Es**	100 **Fm**	101 **Md**	102 **No**	103 **Lr**

KEY/*SLEUTEL*

Atomic number *Atoomgetal*

Electronegativity *Elektronegatiwiteit* — **29** 1,9 **Cu** 63,5 — **Symbol** *Simbool*

Approximate relative atomic mass *Benaderde relatiewe atoommassa*