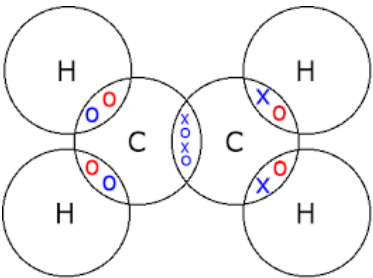


Marking Scheme for Sec 4N Science (Chemistry) Preliminary Exam 2023 Paper 3 & 4**Paper 3**

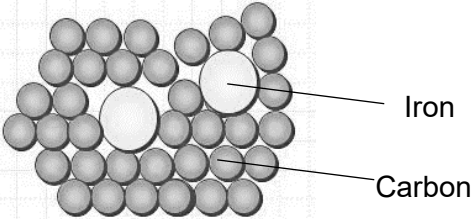
1	B	2	C	3	D	4	C	5	B
6	A	7	D	8	C	9	A	10	B
11	C	12	C	13	D	14	B	15	A
16	B	17	A	18	C	19	B	20	D

Paper 4**Section A [MAX:14M]**

Question No	Answers		Comments
A1	Substance	Diagram(s)	
	(a) Water	C [1]	
	(b) Oxygen gas	E [1]	
	(c) Mercury	B [1]	
	(d) Mixture	F [1]	
A2	<p>(a) (i) Low air-fuel ratio produces higher concentration of CO emitted/ High air-fuel ratio produces lower concentration of CO emitted [1]</p> <p>(ii) Accelerating mode generates higher temperature that <u>allows more nitrogen and oxygen in the air to react</u> to produce NO. [1]</p> <p>(b) <u>Incomplete</u> combustion [1]</p> <p>(c) NO causes breathing difficulty/ eye and lung irritation/ inflammation of the</p>		

	<p>lungs. [1] Reject: Acid rain</p> <p>CO combines with haemoglobin and obstruct oxygen uptake/ headaches and fatigue/ heart damage and loss of consciousness/ death as body tissues do not receive oxygen for respiration [1] Reject: if only write death</p>	
A3	<p>(a) Cracking [1] (b) Number of mol of pentadecane = $5.30 / ((15 \times 12) + 32) = 0.025 \text{ mol}$ [2] [1] for correct Mr; [1] for correct final answer (c) Correct drawing of C_2H_4</p> <div style="display: flex; align-items: center; justify-content: space-around;">  <div style="text-align: left;"> <p>Correct bonding – [1]</p> <p>Correct number of valence electrons for all atoms – [1]</p> </div> </div>	

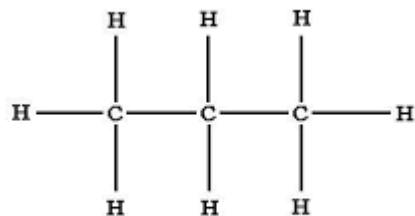
Section B [Max:16] Any 2 questions out of 3

Question No	Answers	Comments
B4	<p>(a) $4M + O_2 \rightarrow 2M_2O$ [1] (b) The reactivity of the alkali metals towards oxygen increases down the group. [1] (c) It reacts very violently/ explosively with water/ Effervescence observed./ Flame observed [1] (d) (i) Correct plotting for all points – [1] (ii) Correct drawing of the curve of best fit, joining the points together– [1] (iii) 71°C [1] (+/- 2) [1] (e) (i) To conserve natural resources/ To save cost of extracting metals/ helps to reduce environmental problems caused by extraction of metals. [1]</p>  <p>(ii) There should be 2 different sizes of atoms – bigger atom to be labelled as iron, smaller atom as carbon [1] No label – [0]</p>	
B5	<p>(a) Correct plotting for all points – [1] (b) Correct drawing of graph, joining the points together using straight lines – [1] (c) 9cm^3 [1] (d) Violet [1] Reject: blue (e) (i) $\text{H}_2\text{SO}_4 + \text{CaCO}_3 \rightarrow \text{CaSO}_4 + \text{CO}_2 + \text{H}_2\text{O}$ [1] (ii) Acidifies lakes and streams, causing aquatic plants and animals die [1] Corrode marble building and statues [1] (iii) Slaked lime/ quicklime/ Calcium oxide/ Calcium hydroxide [1]</p>	

B6

(a) Diesel oil and petrol [1]

(b) There is high number of vehicles/ transportation that requires the use of the fractions. [1]



Propane

(c) (i) [1]

(ii) name of process: Hydrogenation/ Addition [1] conditions: 200°C, Nickel catalyst [1]

(iv) Chemical Test: Add aqueous bromine to each respectively [1]

Observation with propane: No decolorization of bromine/ Solution remains reddish brown [1]

Observation with propene: decolourisation of bromine/ Solution turns from reddish-brown to colourless [1]