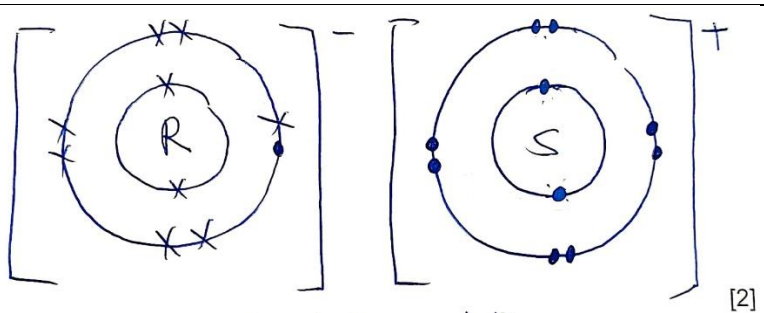
PLMGSS Marking Scheme for 4NA Science Chemistry Prelim Exams 2024

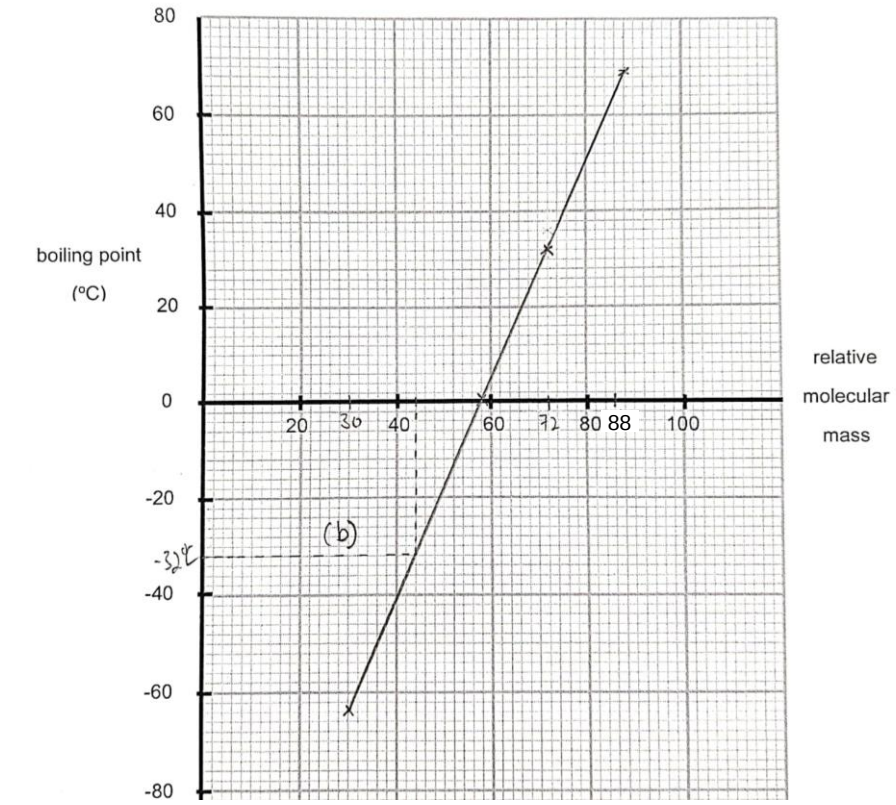
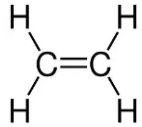
Paper 3 (20 MCQs)

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

Paper 4
Section A (22 marks)

Qn	Answers	Marks
1(a)(i)	**Q** *Marker's Comments*: Most students could answer this.	1
1(a)(iii)	**Q** and **T** *Marker's Comments*: Most students could answer this.	1
1(c)(i)	 *Marker's Comments*: Students need to use different symbols for the electrons of R and S. Students also need to draw all the electrons, and not just the valence electrons. 1m given if (1) one of the ions is correct, (2) both charges are correct but electronic structures are wrong, (3) R gains one electron and S loses one electron, but missing charges, (4) only valence electrons are drawn.	1; cation 1; anion
1(c)(ii)	Any 2 points: Ionic compound/ ionic bonding that exists as a **giant ionic crystal lattice** It has **strong electrostatic forces of attraction** between the oppositely charged ions. A **large amount of energy** is needed to overcome the forces of attraction. *Marker's Comments*: Key words in bold are needed to get the marks. More energy is not accepted – need to say large amount of energy is needed.	1; 1; 1
2(a)	Chlorine is more reactive than bromine and hence chlorine displaces bromine from its aqueous salt solution, sodium bromide, to form a reddish-brown solution.	1

	Marker's Comments: Not well done. Students could not identify that this is a displacement reaction.	
2(b)	$Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$ *Marker's Comments*: Not well done. Students forgot that chlorine and bromine exist as diatomic molecules, and forgot the equation for displacement reaction.	1
3(a)	Ethanol; propanol; butanol *Marker's Comments*: Some students gave the sequence from distil last to distil first.	1
3(b)	It provides a large surface area for the vapour to condense on before it reaches its boiling point. *Marker's Comments*: Students need to state that there is a large surface for condensation, not just to improve condensation.	1
3(c)	Direction of water in/out in the condenser is reversed. *Marker's Comments*: Accepted – there should be boiling chips.	1
4(a)	Molar mass of Na_2CO_3 = 2(23)+12+3(16) = 106 g/mol Number of moles of Na_2CO_3 = 265/106 = 2.50 mol	1; 1
4(b)	Mass of water = 2.5 x (2+16) = 45 g	1
	Marker's Comments: Most students did not know to/how to calculate the molar mass of Na_2CO_3 or H_2O. Most were unable to correctly manipulate/ use the formula no. of mol = mass/molar mass, or quoted a wrong formula (such as that involving the number of particles/ Avogadro's constant).	

5(a)	 All points correctly plotted Straight line passing through all the points *Marker's Comments*: Students are reminded to check their plotted points.	 1; 1
5(b)	–32 or –30 °C [read from student's graph, allow ECF] *Marker's Comments*: A handful of students omitted the negative sign. Many also omitted the unit or gave the wrong unit (°)	1;
5(c)	Any one: 1. Same general formula; 2. Each successive member differs by a -CH_2 group; 3. Same functional group; 4. Undergoes similar chemical reaction; 5. Gradual change in physical properties down the series *Marker's Comments*: Poorly done. Many also stated "same structural formula" which would imply that they are the same molecules.	 1; 1; 1; 1; 1
5(d)(i)	 *Marker's Comments*: Many did not know the formula of ethene.	1;
5(d)(ii)	**Test**: add reddish-brown aqueous bromine/ bromine solution to both substances **Observation with substance A**: reddish-brown bromine solution remains **Observation with ethene**: reddish-brown bromine solution decolourises/ becomes colourless *Marker's Comments*: Many were unaware of the test for saturation as well as the observations.	1; 1; both observations correct
5(e)	carbon dioxide and water (vapour)/steam	1; both correct

	Marker's Comments: Many gave carbon or carbon monoxide despite the question explicitly stating that complete combustion has taken place.	

Section B (8 marks); $^{2}C_{1}$

Question(s) attempted	Q6	Q7	Both Q6 and Q7
Number of students	9	24	18

Students are reminded to choose only one question to do. Q7 was the better attempted question.

Qn	Answers	Marks
6(a)(i)	SO_2 and NO_2 (CO_2 was also accepted) *Marker's Comments*: Many students did not identify that CO and NO are neutral oxides.	1
6(a)(ii)	Acidic gases (such as SO_2 and NO_2) react with oxygen and water vapour/ dissolve in water to form acids. *Marker's Comments*: Poorly done. Many did not know how the acidic oxides formed acid rain.	1
6(a)(iii)	Acid rain corrodes buildings made of limestone/ metallic structures/ harms aquatic life. *Marker's Comments*: Students need to state that the buildings/structures are made of limestone/metal as they react with acids.	1
6(b)(i)	CO; carbon monoxide *Marker's Comments*: Many wrongly identified carbon dioxide.	1
6(b)(ii)	CO binds irreversibly with haemoglobin in our blood, decreasing the supply of oxygen to other parts of the body, causing breathing difficulties and even death. *Marker's Comments*: Most students scored.	1 (effect)
6(c)	Insert a glowing splint into the test-tube containing the gas. The glowing splint relights/ rekindles. *Marker's Comments*: Many wrote the test for hydrogen gas (lighted splint) instead.	1; 1
6(d)	element: N_2, O_2 compound: CO, NO, CO_2, NO_2, SO_2 *Marker's Comments*: Most students scored.	1; all correct
7(a)(i)	magnesium *Marker's Comments*: Most students scored.	1
7(a)(ii)	$2PbO + C \rightarrow 2Pb + CO_2$ *Marker's Comments*: Many students had difficulty writing the formula of PbO.	1
7(a)(iii)	Iron is between zinc and lead in the reactivity series/ iron is less reactive than zinc and more reactive than lead; Hence iron is extracted from its ore by reduction with carbon. *Marker's Comments*: Most students could identify the method of extraction. However, they did not use the information presented in the table (as instructed in the qn) to explain their choice.	1; 1
7(b)(i)	B, zinc, lead, A	1;

	Marker's Comments: Most students scored.	
7(b)(ii)	Magnesium, aluminium Accept potassium, sodium, calcium even though not practical/safe *Marker's Comments*: Most students scored.	1
7(c)(i)	Water; oxygen (reject air) *Marker's Comments*: Most students scored.	1; both correct
7(c)(ii)	If the tin layer is scratched, the iron beneath it rusts. *Marker's Comments*: Many students wrote that tin will rust. Rusting is specifically the corrosion of iron.	1