

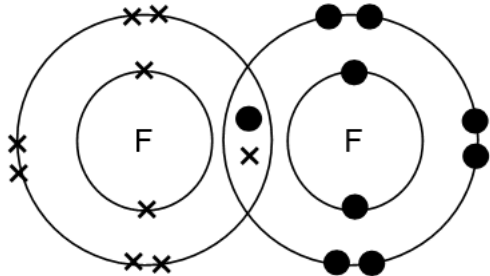
Mark Scheme for LVSS PRELIM 4NA Science Chem 2023

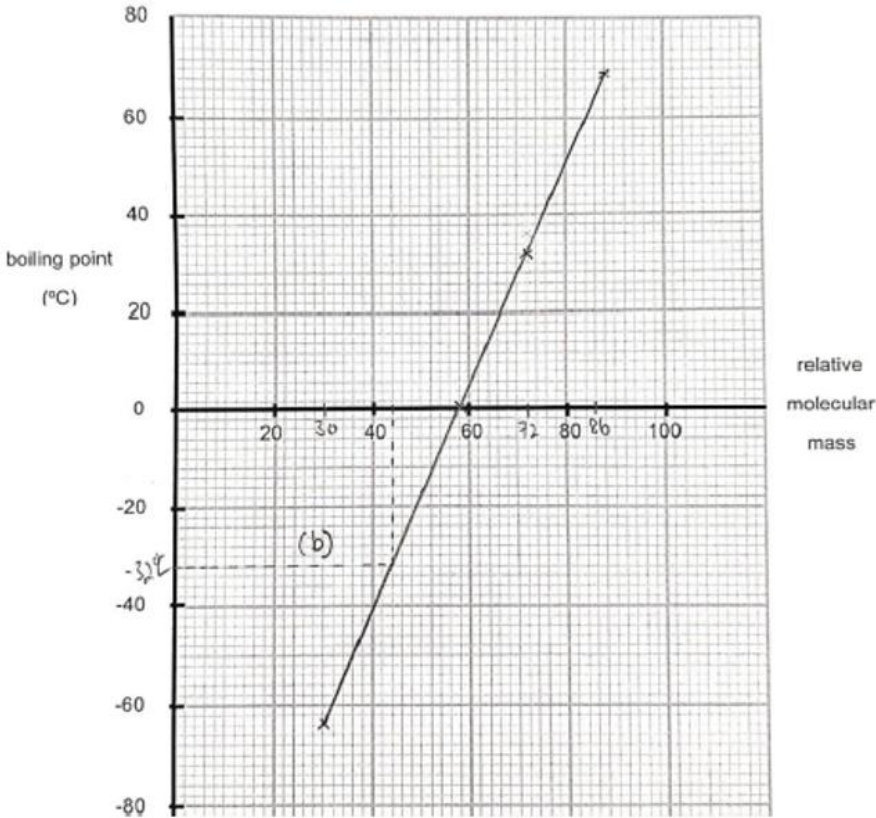
Paper 3

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

Paper 4

Qns		Ans			Marks	Comments	
1	a	B			1		
	b	H has full valence/outermost shell OR noble gas configuration OR octet configuration			1		
	c	G			1		
2	a	salt		formula	relative formula mass, M_r	2	
		copper(II) sulfate		CuSO ₄	160		
		magnesium nitrate		Mg(NO ₃) ₂	24 + 2 x (14 + 16 x 3) = <u>148</u> [1]		
		sodium sulfate		Na ₂ SO ₄	23 x 2 + 32 + 16 x 4 = <u>142</u> [1]		
	<i>Working is not required.</i>						
	b	0.5 x 148 = 74			1		
	c	i	Acid: sulfuric acid Base: sodium hydroxide / sodium oxide <i>Both answers must be correct to be awarded mark.</i>			1	
ii		Heat to form saturated solution [1] Cool to allow crystals to form (Filter crystals), wash and dry crystals } [1]			2		
iii		7			1		
3	a	description		name of substance		2	
		a greenhouse gas		<u>carbon dioxide</u>			
		causes acid rain		<u>nitrogen dioxide</u>			
		a noble gas		<u>argon</u>			

		3 correct: [2] 1-2 correct: [1]		
	b	i Combines with haemoglobin, Prevents red blood cell from carrying oxygen to body	1	
		ii Shortage of oxygen, incomplete combustion of carbon-containing fuel	1	
4	a	i To remove silicon dioxide / sand impurities	1	
		ii $\underline{1} \text{ Fe}_2\text{O}_3 + \underline{3} \text{ CO} \rightarrow \underline{2} \text{ Fe} + \underline{3} \text{ CO}_2$	1	
	b	i oxygen, water / moisture		
		ii Plastic coat [1] mass of nail after 10 weeks remain the same / no change in mass / no additional mass, nail did not rust [1] <i>must mention data from table for 2nd mark</i>	2	
		iii In steel, carbon atom is smaller / different size than iron [1] disrupts the regular arrangement of (iron) atoms, more difficult for layers (of atoms) to slide over each other } [1] In pure iron, only iron atoms present, easy for layers to slide over each other <i>Award 1 mark as long as comparison words are used.</i>	2	
	c	Limited amount left in nature / finite resource / cheaper / less wastage	1	
5	a	Two atoms chemically combined in a molecule	1	
	b	Group VII: 7 electrons in its outermost / valence shell [1] Period 4: contains 4 electron shells [1]	2	
	c	 <i>1 pair of shared electrons: [1] total of 8 electrons in each outer-shell: [1]</i>		

	d	i	<table><tr><td>halogen</td><td>reaction with sodium chloride</td><td>reaction with sodium bromide</td><td>reaction with sodium iodide</td></tr><tr><td>chlorine</td><td></td><td>✓</td><td>✓</td></tr></table> 2 ✓ to get [1]	halogen	reaction with sodium chloride	reaction with sodium bromide	reaction with sodium iodide	chlorine		✓	✓	1	
halogen	reaction with sodium chloride	reaction with sodium bromide	reaction with sodium iodide										
chlorine		✓	✓										
		ii	$\text{Cl}_2 + 2 \text{NaBr} \rightarrow \text{Br}_2 + 2 \text{NaCl}$ OR $\text{Cl}_2 + 2 \text{NaI} \rightarrow \text{I}_2 + 2 \text{NaCl}$ correct formulae: [1] balanced equation: [1]	2									
6	a	 All points plotted correctly: [1] Straight line passing through all the points: [1]		2									
	b	-32 °C dotted lines must be shown on graph		1									
	c	Same general formula; Each successive member differs by a -CH₂ group; Same functional group; Similar chemical reactions Any one of the above		1									
	d	i	catalyst: nickel temperature: 200 °C Both must be correct	1									

		ii	Test: add aqueous bromine to propane and propene (separately) [1] Observation with propane: reddish-brown solution remains unchanged Observation with propene: reddish-brown solution decolourises / turns colourless <i>Both observations must be correct for [1]</i>	2	
	e		Carbon dioxide, water (vapour) <i>Both must be correct for [1]</i>	1	