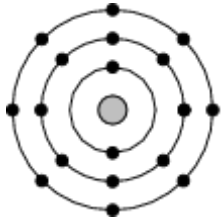
Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
8	1	*(a)*			3	two possible approaches either • below 54°C, NaCl more soluble (1) • at 54°C, solubilities the same (1) • above 54°C, $CuSO_4$ more soluble (1) or • below 54°C, $CuSO_4$ increases a lot with temperature, NaCl does not (1) • above 54°C, trend continues but $CuSO_4$ is more soluble than NaCl (1) • at 54°C, solubilities the same (1)	converse converse		
		(b)			2	56 – 29 = 27 (1) no tolerance 27/2 = 13.5 (1) ecf possible award (2) for cao			

Question Number								
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
		(c)			2	water freezes at 0°C / is ice at 0°C / is solid at 0°C / 0°C is the freezing point of water (1) water boils at 100°C / is steam at 100°C / is a gas at 100°C / 100°C is the boiling point of water (1)	these are the freezing point and boiling point of water (2) these are the fixed points of water (2) water is only liquid between these two temperatures (2) water is liquid between these temperatures (1)	melting point	

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
9	2	*(a)*	(i)		5	symbol protons neutrons electrons fluorine 10 9 calcium $^{40}_{20}Ca$ 20 argon 18 (1) for each correct answer			
			(ii)		1	calcium/Ca and argon /Ar both needed			
			(iii)		1			2,8,8	
		(b)			2	Similarity: (same) number of protons (1) Difference: (different) number of neutrons (1)	p for proton n for neutron	reference to atomic number and mass number	reference to electrons

Question Number				
FT	HT		Mark	Answer
9	3	*(a)*	6 QWC	Indicative content • all three metals float, move about the water surface and produce bubbles • lithium reacts slowly without melting • sodium reacts quickly forming a sphere • potassium reacts violently forming a sphere and burning with a lilac flame • reactivity increases down the group *word /symbol equations not expected but creditworthy* 5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. 3-4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. 1-2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. 0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.
		(b)	2	Na_2O (1) correctly balanced (1) formula must be correct before balancing mark can be awarded

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	4	*(a)*			5	step 1 – use of soap solution to identify distilled water, needs fair testing element for both marks • add 1cm^3 soap (solution) to 5 cm^3 of each water sample (1) • shake for 1 minute/shake for the same time (1) • distilled water most froth (1) step 2 • boil unidentified samples and repeat step 1 (1) • temporary hard water lathers after boiling; permanent hard water still does not lather after boiling (1) credit alternative methods – up to (3) for method/fair test and up to (2) for conclusions	add soap to each water sample and shake (1)		washing up liquid
		(b)			1	reference to appliance needed furs up kettles/ kettles less efficient / boilers fur up / boilers less efficient / pipes fur up / pipes less efficient		reference to soap 'wastes energy' 'decreases efficiency' 'blocks pipes'	

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	5	*(a)*			3	two discrete diagrams needed - diagram 1 showing transfer of electrons - diagram 2 showing ions diagram 1 two potassium atoms lose 1 electron each (1) one sulfur atom gains 2 electrons (1) diagram 2 two K^+ ions and one S^{2-} ion formed (1) *octet of electrons around* S^{2-} *not needed*	if transferred electrons on both potassium and sulfur award (1)		
		(b)			2	two shared pairs of electrons (S—F) (1) octet of electrons around S and both F atoms (1)			

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	6	*(a)*			1	A steepest line / steepest graph / finishes in the shortest time both needed	greatest gradient / highest gradient / quickest reaction	precipitate	
		(b)			2	time = 22 (1) 0.045 / 0.0455 / 0.04545 (1) award (2) for cao	21 0.048 / 0.0476		0.05
		(c)			3	higher the temperature, faster the rate (1) particles have more energy / move faster at higher temperature (1) must be correct to award third mark therefore greater chance of (successful) collisions / more (successful) collisions per second (1)	more particles have required activation energy	more collisions	

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	7	*(a)*			3	A iron(III) chloride / $FeCl_3$ (1) B sodium chloride / NaCl (1) C bromine / Br_2 (1)		iron chloride gas	iron(II) chloride Br
		(b)	(i)		2	$Ag^+ + Cl^-$ (1) AgCl (1) ignore state symbols			
			(ii)		3	$2AgNO_3 + MgBr_2 \rightarrow 2AgBr + Mg(NO_3)_2$ award (1) each for both products balancing (1) only award balancing mark if both products are correct			

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	8	*(a)*			3	mass carbon and hydrogen divided by respective A_r values e.g. carbon 9/12 and hydrogen 2/1 (1) ratio of 3:8 (1) C_3H_8 (1) ecf possible if formula given is an alkane award (1) mark only for correct answer with no working			
		(b)			2	$M_r(C_4H_{10})$ = 58 (1) (48/58) × 100 = 82.76 (1) consequential marking	82.8 / 83		

Question Number			
FT	HT	Mark	Answer
	9	6 QWC	Indicative content • ethene (monomer) contains a C=C bond/ ethene (monomer) is unsaturated • double bonds in ethene molecules 'open' • ethene molecules join together • long chain molecule formed/ polymer formed/ single molecule formed • balanced symbol equation, showing repeating unit • monomer & repeating unit, for example, for polypropene from propene/ PVC from chloroethene / polytetrafluoroethene from tetrafluoroethene 5-6 marks: The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. 3-4 marks: The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. 1-2 marks: The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. 0 marks: The candidate does not make any attempt or give a relevant answer worthy of credit.