DEPARTMENT FOR CURRICULUM,
LIFELONG LEARNING AND EMPLOYABILITY
Directorate for Learning and Assessment Programmes
Educational Assessment Unit

Annual Examinations for Secondary Schools 2022

YEAR 9 CHEMISTRY MARKING SCHEME

Item			Answer and guidelines	Marks
			Section A	
1	a		Evaporation.	1
	b	i	T	1
		ii	F	1
		iii	T	1
		iv	F	1
	c	i	F	1
		ii	T	1
		iii	F	1
		iv	F	1
	d	i	chemical	1
		ii	physical	1
		iii	physical	1
			Total	**12**
2	a		b	1
	b		Only **one type of atom** makes up iodine molecules.	1
	c	i	Any one of: • Shiny when freshly cut • Good conductors of heat and electricity • Relatively high melting point • Relatively high density • Malleable (can be hammered) • Ductile (can be drawn into wires) • Usually solid at room temperature • Most metals are sonorous or make a bell-like sound when struck *Accept other suitable answers.*	1
		ii	Made of more than one type of atom chemically combined.	1
		iii	$Fe + S \rightarrow FeS$ *1 mark for formulae, 1 mark for balancing.*	2
			Total	**6**
3	a		carbon dioxide; water	1,1
	b	i	Presence of oxygen or air; presence of water	1,1
		ii	A	1
		iii	Nail in test-tube A is in water and exposed to oxygen in air.	1
			Total	**6**

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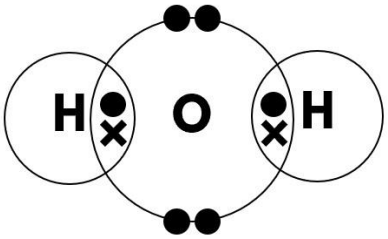
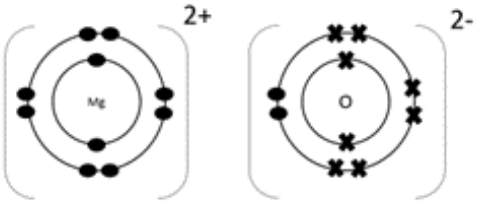
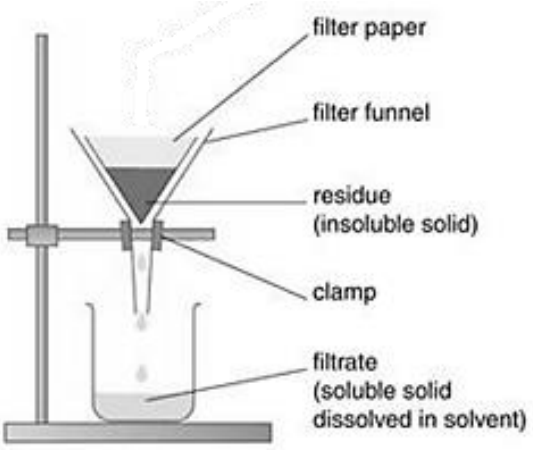
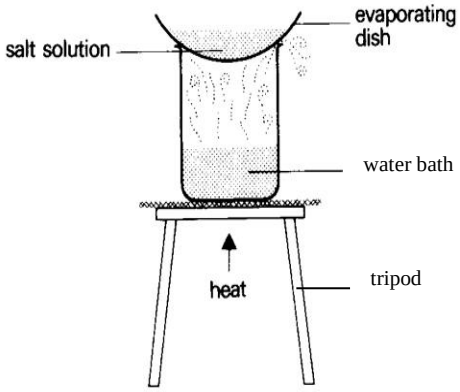
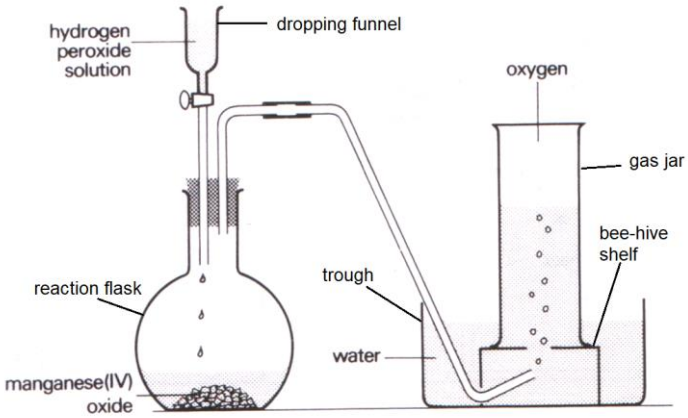
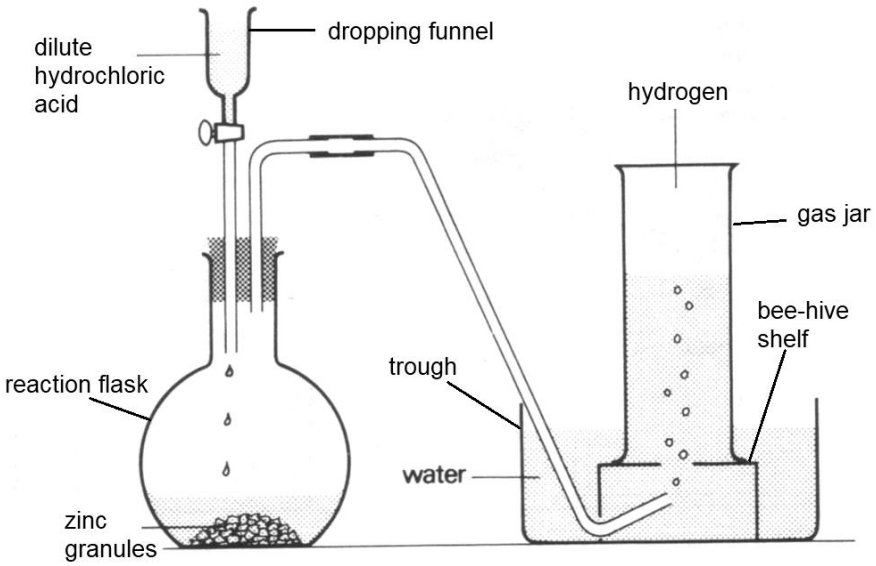
4	a		 *1 mark for drawing atoms joined correctly.* *1 mark for showing correctly shared electrons.* *1 mark for correct number of electrons.* *Accept atoms touching each other.*	3
	b		 *1 mark for each ion drawn correctly including brackets,* *1 mark for correct charges.*	3
			Total	**6**
5	a	i	C	1
		ii	A	1
	b	i	increases	1
		ii	decreases	1
	c		1 kg = 1000 g In 1000 g water, 5000 g sugar dissolve In 100 g water, ? 5000 × 100 / 1000 = **500 g/100 g H_2O**	1 1
			Total	**6**
6	a		Sample B Sample A	1 1
	b		A: Temporary and permanent hardness. B: Temporary hardness. *Do not award marks if for A, only one type of hardness is given.*	1 1
	c		Permanent hardness	1
	d		On adding soap solution, soft water lathers while hard water does not.	1
			Total	**6**
7	a	i	Orange juice	1
		ii	**Does not ionise completely in solution** so it gives fewer H^+ ions.	1
		iii	Tonic water.	1
	b	i	**1**H_2SO_4(aq) + **2NaOH**(aq) → **1**Na_2SO_4(aq) + **2**H_2O(l) *1 mark for formulae, 1 mark for balancing.* *Accept as correct if no number is given where balancing is 1.*	2
		ii	**2**HNO_3(aq) + **K_2CO_3**(aq) → **2**KNO_3(aq) + **H_2O**(l) + **1**CO_2(g) *1 mark for formulae, 1 mark for balancing.* *Accept as correct if no number is given where balancing is 1.*	2
	c		Sodium hydrogen sulfate - $NaHSO_4$	1
	d	i	Lead(II) nitrate; sodium chloride	1,1

Item			Answer and guidelines	Marks
			Accept any other suitable soluble salts.	
		ii	$Pb(NO_3)_2 + 2NaCl \rightarrow PbCl_2 + 2NaNO_3$ *1 mark for formulae, 1 mark for balancing.*	2
			Total	**12**
8	a	i	RFM of NH_4NO_3: $(14 \times 2) + (1 \times 4) + (3 \times 16) = 80$	1
		ii	% nitrogen by mass: $(28/80)100 = 35\%$	1
	b	i	Divide by RAM: Carbon: 83.7/12 = 6.975 Hydrogen: (100-83.7)/1 = 16.300 Divide by smallest to work out ratio: Carbon: 6.975/6.975 = 1.000 Hydrogen: 16.300/6.975 = 2.337 Simplest ratio (multiply by 3): Carbon: $1.000 \times 3 = 3.000$ Hydrogen: $2.337 \times 3 = 7.011$ Empirical formula: **C_3H_7** *Apply follow through.*	1 1 1
		ii	RMM of $C_3H_7 = (12 \times 3) + (1 \times 7) = 43$ $86/43 = 2$ Therefore, molecular formula is $(C_3H_7) \times 2$ = **C_6H_{14}** *Apply follow through.*	1
			Total	**6**
Section B				
9	a	i	Method: • Add water and stir well. • Filter mixture. Insoluble silver chloride is obtained as residue. Silver nitrate solution is obtained as filtrate. • Wash residue well with distilled water to obtain silver chloride in pure form. Leave it to dry. • Evaporate the water slowly from the silver nitrate solution. • Use a water bath to heat the solution (avoid direct heating since silver nitrate decomposes on heating).	1 1 1 1 1
		ii	Filtration:  *1 mark for filter funnel.* *1 mark for beaker or conical flask.* *1 mark for correctly labelling silver chloride residue.* *1 mark for clearly labelling silver nitrate filtrate solution.* *Deduct ½ mark for each missing label.*	4

Item			Answer and guidelines	Marks
			Evaporation:  *1 mark for evaporating dish.* *1 mark for drawing water bath.* *1 mark for drawing tripod & Bunsen burner.* *1 mark for clearly labelling silver nitrate solution.* *Deduct ½ mark for each missing label.* *Award only 1 mark if the direct heated method is chosen and drawn correctly.*	4
	b	i	Fractional distillation.	1
		ii	Cools down any vapour passing through it which turns to liquid.	1
		iii	Improves the separation of liquids with different boiling points being distilled.	1
		iv	Water	1
		v	Liquids have different boiling points. The liquid with the lower boiling point boils off first.	1 1
		vi	Fractional distillation of crude oil *Accept fractional distillation of liquid air.*	1
			Total	**20**
10	a	i	$2H_2O_2\,(aq) \rightarrow 2H_2O(l) + O_2(g)$ *1 mark for formulae, 1 mark for balancing, 1 mark for state symbols.*	3
		ii	Manganese(IV) oxide / MnO_2	1
		iii	 *1 mark each for reaction flask, dropping funnel.* *Accept any suitable type of flask.* *2 marks for gas collection apparatus: gas jar, trough & shelf.* *Accept any suitable gas collection apparatus.* *1 mark for correct labelling of reagents used.* *Deduct ½ mark for each missing label.*	5
	b	i	5.1 – 2.4 = **2.7 g H_2O**	1

		ii	RMM H_2O_2 = (1 × 2) + (16 × 2) = 34 34.0 g : 1 mole 5.1 g : ? 5.1/34 = **0.15 moles H_2O_2** *Allow follow through.*	1 1
	c	i	Fe_2O_3: basic Al_2O_3: amphoteric CO: neutral SO_2: acidic	1 1 1 1
		ii	RFM of Fe_2O_3 = (56 × 2) + (16 × 3) = **160** RMM of CO_2 = 12 + (16 × 2) = **44** Mole ratio Fe_2O_3 : CO_2 = **1 : 3** Therefore 160 g Fe_2O_3 : (44 × 3) = 132 g CO_2 160,000 g : (132 × 160,000) / 160 = **132000 g CO_2** Moles CO_2 = 132000 / 44 = **3000** moles *Accept if moles of CO_2 are calculated before mass.* *Allow follow through.*	 1 1 1 1
			Total	**20**
11	a	i	$2HCl(aq) + Zn(s) \rightarrow ZnCl_2(aq) + H_2(g)$ *1 mark for formulae, 1 mark for balancing, 1 mark for state symbols.* *Accept other suitable metals.*	3
		ii	 *1 mark each for reaction flask, dropping funnel.* *Accept any suitable type of flask/dropping or thistle funnel.* *2 marks for gas collection apparatus: gas jar, trough & shelf.* *Accept any suitable gas collection apparatus.* *1 mark for correct labelling of reactants.* *Deduct ½ mark for each missing label.*	5
		iii	Insert a lighted wooden splint into a test tube full of hydrogen. Hydrogen burns with a 'pop'.	1 1

	b		9.2 g + 0.4 g = **9.6 g**	1
	c	i	$CuO + H_2 \rightarrow Cu + H_2O$ *1 mark for formulae, 1 mark for balancing.*	2
		ii	RFM of CuO = 63.5 + 16 = 79.5 Moles of CuO in 159 g = 159/79.5 = **2 moles** 1 mole of CuO contains $6.02 \times 10^{23} \times 2 = 1.204 \times 10^{24}$ ions (since each CuO has 2 ions (Cu^{2+} and O^{2-}) So, 2 moles CuO have = $1.204 \times 10^{24} \times 2$ = **2.408×10^{24} ions**	1 1 1
	d		RFM Fe_2O_3 = (56 × 2) + (16 × 3) = **160** Mole ratio Fe_2O_3 : Fe = **1 : 2** Therefore 160 g Fe_2O_3 : (56 × 2) = 112 g Fe 1600 g : (112 × 1600) / 160 = **1120 g Fe** Moles Fe = 1120 / 56 = **20** moles *Accept if moles of Fe are calculated before mass.*	1 1 1 1
			Total	**20**