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Mark Scheme Summer 2009

GCE

GCE Chemistry (8CH07)
International Supplement 2

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6CH07/01

Question Number	Correct Answer	Reject	Mark
1 (a)(i)	No (colour) change (to flame) OR no flame colour **Accept** No colour	White flame	**1**

Question Number	Correct Answer	Reject	Mark
1 (a)(ii)	Effervescence / bubbling / fizzing *IGNORE* hissing		**1**

Question Number	Correct Answer	Reject	Mark
1 (a)(iii)	**Observation:** (Lime water) turns milky / cloudy or white precipitate (formed) (1) **Accept** White solid (formed) / chalky **Inference:** carbon dioxide / CO_2 (1)	Turns white	**2**

Question Number	Correct Answer	Reject	Mark
1 (a)(iv)	**Observation:** White precipitate (formed) (1) **Accept** White solid / crystal (formed) *IGNORE* references to heat given out and to precipitate insoluble in excess **Inference:** Magnesium hydroxide / $Mg(OH)_2$ (1)	White substance Confirms magnesium present	**2**

Question Number	Correct Answer	Reject	Mark
1 (b)(i)	Lithium / Li^+ (1) Strontium / Sr^{2+} (1) **Accept** Calcium / Ca^{2+} (1)	Rubidium Li, Sr, Ca (penalise use of element symbol once only)	**2**

Question Number	Correct Answer	Reject	Mark
1 (b)(ii)	Dissolves (in the ammonia) (to form a colourless solution) **Accept** Soluble *IGNORE* references to dilute ammonia	Partially dissolves	**1**

Question Number	Correct Answer	Reject	Mark
1 (b)(iii)	**Observation:** Brown or red-brown or orange (1) **Inference:** Bromine / Br_2 (1)	Red Bromide (for bromine)	**2**

Question Number	Correct Answer	Reject	Mark
1 (b)(iv)	**From:** Orange or yellow To: blue or green or blue-green		**1**

Question Number	Correct Answer	Reject	Mark
1 (b)(v)	**Mark two points independently** (Hydrogen) bromide oxidized / bromine oxidation number increased (from −1 to 0) / changes from -1 to 0 /Bromide loses an electron / (hydrogen) bromide is a reducing agent (1) sulfuric acid reduced / sulfur oxidation number decreases (from (+)6 to (+)4) / changes from (+)6 to (+)4 / sulfate gains electrons / sulfuric acid is an oxidizing agent (1) **Accept** (+)VI to (+)IV sulfate reduced		**2**

Question Number	Correct Answer	Reject	Mark
2 (a)(i)	**Vertical** line at 3.5 minutes intersects extrapolated top line (1) **Horizontal** extrapolated lower line and 66-69 minus 20-22 = $\triangle T$ (1)	incorrect or no extrapolation line joining points at 3 & 4 minutes & extrapolated to intersect top line (0)	**2**

Question Number	Correct Answer	Reject	Mark
2 (a)(ii)	$(1 \times 50 \times 10^{-3}) = 0.0500$ *IGNORE* sf		**1**

Question Number	Correct Answer	Reject	Mark
2 (a)(iii)	65.4 x 0.05 = 3.27 (g) / 3.3 (g) **Accept** 65 x 0.05 = 3.25 (g) / 3.3 (g)		**1**

Question Number	Correct Answer	Reject	Mark
2 (a)(iv)	Heat capacity negligible **Accept:** low specific heat capacity or zinc absorbs less heat than solution	Mass negligible No heat absorbed by zinc All heat absorbed by solution	**1**

Question Number	Correct Answer	Reject	Mark
2 (a)(v)	50 x 4.18 x $\triangle T$ (1) ($\triangle T$ CQ on (a)(i)) Penalise use of incorrect mass here only. *IGNORE* c = 4.2 $Jg^{-1}℃^{-1}$ $\triangle T$ / Heat energy (kJ) 44 / 9.20 45 / 9.41 46 / 9.61 47 / 9.82 48 / 10.0(3) 49 / 10.2(4) (units if given must be consistent) (1) *IGNORE* sf except 1 sf		**2**

Question Number	Correct Answer	Reject	Mark
2 (a)(vi)	= − answer to (a)(v) ÷ answer to (a)(ii) (1) For 0.05 mol: $\triangle T$ / Heat energy (kJ) / $\triangle H$ / kJ mol^{-1} 44 / 9.20 / -180 45 / 9.41 / -190 46 / 9.61 / -190 47 / 9.82 / -200 48 / 10.0(3) / -200 49 / 10.2(4) / -200 CQ on moles from 2 (a)(ii) Sign **and** 2 sf (1) [this mark may be awarded for any **calculated** value]		**2**

Question Number	Correct Answer	Reject	Mark
2 (b)(i)	Ensure equilibration or steady temperature or same temperature (as surroundings)	More accurate temperature	**1**

Question Number	Correct Answer	Reject	Mark
2 (b)(ii)	To allow for cooling / a cooling correction / to compensate for heat loss	Temperature correction To determine maximum temperature change More accurate temperature / $\triangle T$	**1**

Question Number	Correct Answer	Reject	Mark
2 (b)(iii)	Low heat capacity Good insulator Poor heat conductor Low mass Absorbs less heat	Low **specific** heat capacity	**1**

Question Number	Correct Answer	Reject	Mark
2 (b)(iv)	Ensure uniform temperature **Accept** to spread out heat (uniformly) *IGNORE* references to mixing reagents, increasing reaction rate, enabling reactants to react and temperature accuracy.		**1**

Question Number	Correct Answer	Reject	Mark
2 (b)(v)	Burette / pipette / measuring cylinder /volumetric or graduated flask	Beaker /conical flask	**1**

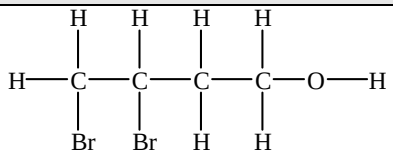
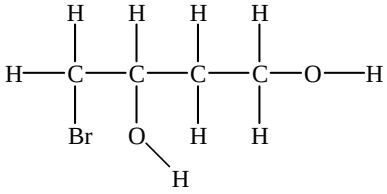
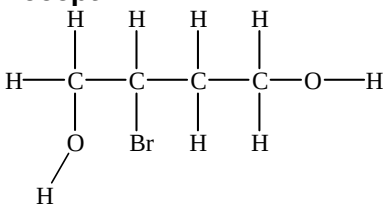
Question Number	Correct Answer	Reject	Mark
2 (b)(vi)	Lid on polystyrene cup/ Increase insulation **Accept** Put cup in a beaker	Magnetic stirrer	**1**

Question Number	Correct Answer	Reject	Mark
2 (c)	Zn>Pb>Cu OR Zinc **displaces** both so is most reactive (1) The more exothermic / negative (**accept** 'the larger') the $\triangle$H the greater the difference in reactivity (so lead more reactive than copper) (1) If the order of reactivity is reversed maximum 1	Answers in **just** terms of reactivity or electrochemical series Generalised answers References to energy or enthalpy **required** for the reaction	**2**

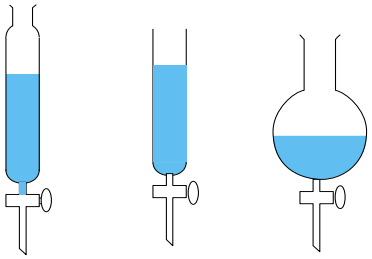
Question Number	Correct Answer	Reject	Mark
3 (a)(i)	**Observation:** Steamy/misty /white fumes (1) **Explanation:** Hydrogen chloride / HCl formed OR chloroalkene / chloro- compound formed OR Substitution reaction with OH (1)	Smoke or solid Hydrochloric acid Chloroalkane Just OH / alcohol group reacts (with PCl_5)	**2**

Question Number	Correct Answer	Reject	Mark
3 (a)(ii)	**Observation:** Purple to colourless or brown (1) **Explanation:** Addition to C=C /alkene **OR** oxidation of C=C /alkene **OR** OH / alcohol group oxidised (1) **Accept** Reacts with C=C to form diol or with OH to form an aldehyde or a carboxylic acid **OR** manganate(VII) / permanganate / MnO_4^- to MnO_2 (if brown) or Mn(II) / Mn^{2+} (if decolourized)	Just 'decolourized' 'Reacts' alone instead of addition or oxidation 'Due to the presence of C=C /alkene / OH' A oxidised	**2**

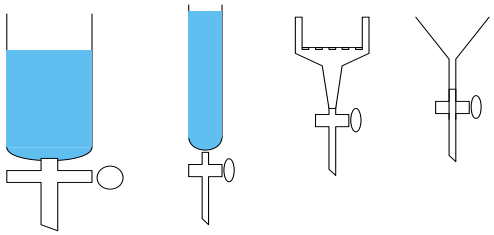
Question Number	Correct Answer	Reject	Mark
3 (a)(iii)	**Observation:** Orange or yellow or brown (**accept** red-brown) to colourless (1) **Explanation:** (Bromine) addition to C=C /alkene (Bromine) reacts with C=C /alkene to form dibromoalkanol / dibromo compound (1)	'pink' instead of purple 'clear' instead of colourless Just 'decolourized' Reaction alone instead of addition dibromoalkane	**2**

Question Number	Correct Answer	Reject	Mark
3 (b)	 OR  **Accept**  **Accept** OH for O—H		**1**

Question Number	Correct Answer	Reject	Mark
4 (a)	Funnel with neck & tap (1) *IGNORE* stopper Organic layer above aqueous layer (1) Stand alone See diagrams	Conical /filter / Buchner funnel with tap Funnel too full to be stoppered	**2**



YES



NO

Question Number	Correct Answer	Reject	Mark
4 (b)(i)	(Organic & aqueous) layers are immiscible **OR** consequence of not shaking e.g. layers form **Accept** 'to ensure layers mix *IGNORE* references to rate	Just 'to mix reagents' Explanations in terms of density differences	**1**

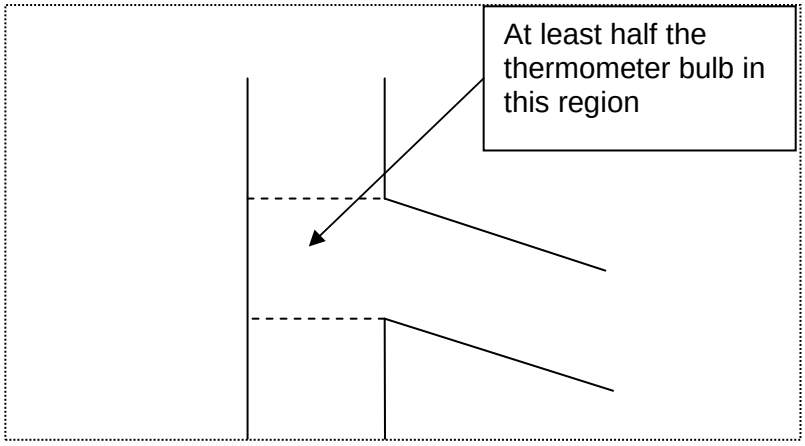
Question Number	Correct Answer	Reject	Mark
4 (b)(ii)	Neutralize (excess) acid / H^+ **Accept** remove acid / H^+ React with acid *IGNORE* Use of HCl for hydrochloric acid release of CO_2	Just 'neutralize / neutralization	**1**

Question Number	Correct Answer	Reject	Mark
4 (b)(iii)	Carbon dioxide / CO_2 /gas is formed (1) Release pressure / pressure builds up (1)		**2**

Question Number	Correct Answer	Reject	Mark
4 (b)(iv)	Drying agent or to remove water	Dehydrating agent	**1**

Question Number	Correct Answer	Reject	Mark
4 (b)(v)	To pour off the liquid leaving the solid behind	Pour / pour carefully / transfer	**1**

Question Number	Correct Answer	Reject	Mark
4 (c)(i)	Bulk of the thermometer bulb adjacent to the outlet leading to the condenser (see diagram)		**1**



Question Number	Correct Answer	Reject	Mark
4 (c)(ii)	Water in through the lower tube and out through the upper If words are used (water in & water out) ignore the direction of any arrows		**1**

Question Number	Correct Answer	Reject	Mark
4 (d)	Mass of alcohol = 5 x 0.805 = 4.025 (g) (1) Moles of alcohol = 4.025 ÷ 88 = 0.0457 = moles of 2-chloro-2-methylbutane Mass 2-chloro-2-methylbutane (100% yield) = 0.0457 x 106.5 = 4.87 70% yield = 4.87 x $\frac{70}{100}$ = 3.41 g (1) ignore sf except for 1 sf If the molar masses are transposed penalise once (answer = 2.32 g) Correct answer and some working (2)		**2**

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