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Mark Scheme (Results)
January 2011

GCE

GCE Chemistry (6CH07/01)

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Question Number	Acceptable Answers	Reject	Mark
1 (a) (i)	Sodium hydroxide (solution) / NaOH(aq) / NaOH Potassium hydroxide (solution) / KOH(aq) /KOH Allow calcium hydroxide (solution) / $Ca(OH)_2$(aq) / $Ca(OH)_2$	Alkali Aqueous ammonia Ammonium hydroxide	**1**

Question Number	Acceptable Answers	Reject	Mark
1 (a) (ii)	**Observation**: White precipitate (or ppt or ppte) Allow white solid / suspension **(1)** **Inference**: any two valid ions gain both marks Sulfate or sulfate(VI) or sulphate or sulphate(VI) or SO_4^{2-} **(1)** Carbonate or CO_3^{2-} **(1)** Allow hydrogensulfate / hydrogensulfate(VI) / hydrogensulphate / hydrogensulphate(VI)) / HSO_4^- Allow hydrogencarbonate / HCO_3^- If a formula is used charge must be correct Ignore 'barium'	(solution) goes cloudy Incorrect oxidation number if used hydrogensulfite (or hydrogensulfate(IV))	**3**

Question Number	Acceptable Answers	Reject	Mark
1 (a) (iii)	(Gas evolved) was pungent / acrid or turned (orange) potassium dichromate / dichromate(VI) / $K_2Cr_2O_7$ green / blue Allow dichromate (etc) ions / $Cr_2O_7^{2-}$ or decolorized potassium manganate(VII) / permanganate (allow potassium manganate) /$KMnO_4$ Allow manganate(VII) (etc) ions /MnO_4^- Allow turns blue litmus red	Steamy fumes Was acidic /sulfur dioxide / SO_2 Incorrect oxidation number if used	**1**

Question Number	Acceptable Answers	Reject	Mark
1 (a) (iv)	With HCl(g) (allow HCl) / conc HCl on a glass rod or stopper or open bottle **(1)** White fumes /smoke **(1)** Observation mark **not** stand alone but award for a near miss (e.g. 'add (conc.) HCl(aq)') No TE on a forbidden test (indicators / smell)	Add conc HCl Steamy / misty	**2**

Question Number	Acceptable Answers	Reject	Mark
1 (b) (i)	Calcium (ion) or Ca^{2+} (ion)	Ca / Ca^{+}	**1**

Question Number	Acceptable Answers	Reject	Mark
1 (b) (ii)	Pink Allow red or purple		**1**

Question Number	Acceptable Answers	Reject	Mark
1 (b) (iii)	Nitrogen dioxide or or nitrogen(IV) oxide or NO_2 Allow dinitrogen tetroxide or N_2O_4	Incorrect oxidation number if used	**1**

Question Number	Acceptable Answers	Reject	Mark
1 (b) (iv)	Oxygen or O_2	O	**1**

Question Number	Acceptable Answers	Reject	Mark
1 (b) (v)	Nitrate or nitrate(V) or NO_3^-	Incorrect oxidation number if used Incorrect / no charge	**1**

Question Number	Acceptable Answers	Reject	Mark
1 (b) (vi)	$Ca(NO_3)_2$ **(1)** H_2O **(1)** or $Ca(NO_3)_2.H_2O$ **(2)** If this formula is correct, ignore incorrect formula / charge in 1(b)(v) TE on a name or **correct** formula from 1(b)(v)	Name H_2O with no attempt at a compound formula	**2**

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Question Number	Acceptable Answers	Reject	Mark
2 (a)	**Test** Add PCl_5 or phosphorus pentachloride or phosphorus(V) chloride **(1)** Ignore heat **Result** Steamy or misty fumes or fumes which turn litmus or UI red **(1)** Allow white fumes **OR** **Test** Add sodium **(1)** **Result** Effervescence / gas which pops with a lighted splint **(1)** **OR** **Test** Add named carboxylic acid and sulfuric / hydrochloric acid **(1)** **Result** Sweet / pear drops / glue smell **(1)** Observation marks **not** stand alone Allow oxidizing agents (max 1) **Test** Add acidified (potassium) dichromate / dichromate(VI) **Result** orange to / turns green/blue OR **Test** Add acidified (potassium) manganate(VII) or permanganate Allow acidified potassium manganate **Result** Purple to / turns colourless or decolorized	PCl_3 PCl_5 solution White smoke HCl observed	**2**

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Question Number	Acceptable Answers	Reject	Mark
2 (b)	Elimination **(1)** Allow dehydration **Test** Bromine (water /organic solvent) **(1)** **Result** (Orange or red-brown or brown or yellow to) /turns colourless or decolorized **(1)** Ignore clear **Test** Acidified potassium manganate (VII) or permanganate **(1)** Allow acidified potassium manganate **Result** (Purple to) /turns colourless or decolorized **(1)** **Test** Alkaline potassium manganate (VII) or permanganate **(1)** Allow acidified potassium manganate **Result** (Purple to) brown (ppt) or turns green **(1)**		**3**

Question Number	Acceptable Answers	Reject	Mark
3 (a) (i)	Gas syringe **(2)** (cylinder & plunger reasonably distinct) or Collection over water **(1) graduated** collection vessel **(1)** Max (1) if gaps in apparatus or if delivery tube goes straight through the walls of trough and collection vessel		**2**

Question Number	Acceptable Answers	Reject	Mark
3 (b) (i)	5 points correctly plotted **(1)** 8 or 9 points correctly plotted **(2)** Smooth best fit line **(1)**		**3**

Question Number	Acceptable Answers	Reject	Mark
3 (b) (ii)	29.0/20 (= 1.45) = 1.5 **(1)** $cm^3 s^{-1}$ or cm^3/s **(1)** (2 SF only)		**2**

Question Number	Acceptable Answers	Reject	Mark
3 (b) (iii)	Initial rate faster / higher / line steeper **(1)** Final gas volume the same **(1)**		**2**

Question Number	Acceptable Answers	Reject	Mark
3 (b) (iv)	Amount of H_2O_2 & therefore volume /amount of O_2 remains the same **(1)** (both points needed) Greater surface area (of MnO_2) **(1)** Results in more (frequent) collisions (between H_2O_2 molecules & MnO_2) **(1)**	No consequential marking 'smaller pieces' or fine powder(for greater surface area)	**3**

Question Number	Acceptable Answers	Reject	Mark
3 (c)	Weigh **(1)** filter **(1)** dry **(1)** and re-weigh **(1)** the catalyst Allow evaporation of H_2O_2/ H_2O for filter mark Repeat experiment using fresh H_2O_2 (1) Rate is the same / similar (1)	Just 'mass constant'	**4**

Question Number	Acceptable Answers	Reject	Mark
4 (a)	Burette or pipette Allow volumetric flask	Measuring cylinder	**1**

Question Number	Acceptable Answers	Reject	Mark
4 (b)	Bromine volatile or low boiling point or evaporates easily Or To ensure that the bromine does not evaporate		**1**

Question Number	Acceptable Answers	Reject	Mark
4 (c)	Reaction is exothermic or gives off heat (allow reaction is vigorous)	Reaction is fast	**1**

Question Number	Acceptable Answers	Reject	Mark
4 (d)	Round or pear-shaped flask with some attempt at a vertical condenser **(1)** Correct **vertical** condenser **(1)** Working reflux apparatus (heat, correct water flow, no stopper, no gaps, apparatus not one piece) **(1)** Ignore use of a Bunsen burner Fully correct distillation **(1)** max		**3**

Question Number	Acceptable Answers	Reject	Mark
4 (e)	Product / bromoethane is volatile or has a low boiling point or evaporates easily Allow To prevent evaporation of the bromoethane Or Bromoethane boils at 38.4 (ºC) Or To ensure bromoethane is liquid		**1**

Question Number	Acceptable Answers	Reject	Mark
4 (f) (i)	Neutralize the (phosphoric) **acid** / **bromine** Allow react with or remove the **acid** / **bromine**		**1**

Question Number	Acceptable Answers	Reject	Mark
4 (f) (ii)	Drying agent or to remove water	Dehydration	**1**

Question Number	Acceptable Answers	Reject	Mark
4 (g)	From: 35, 36, 37 or 38 (ºC) To: 39, 40, 41 or 42 (ºC)	Fractions of degrees	**1**

Question Number	Acceptable Answers	Reject	Mark
4 (h) (i)	10 x 0.789/46 (=0.17152) = 0.172 (ignore sf except 1 sf)	incorrect rounding	**1**

Question Number	Acceptable Answers	Reject	Mark
4 (h) (ii)	0.17152 x 109 = 18.6959 = 18.7 (g) 0.172 x 109 = 18.748 = 18.7 (g) 0.17 x 109 = 18.53 = 18.5 (g) ECF on 4 (h)(i) Allow use of 108.9 (from periodic table) If M_r values transposed in 4hi) and 4hii) (mass = 3.33 g) penalise once (ignore sf except 1 sf)		**1**

Question Number	Acceptable Answers	Reject	Mark
4 (h) (iii)	100 x 13.3/18.7 = 71.123 = 71.1 (%) 100 x 13.3/18.5 = 71.8919 = 71.9 (%) Or using moles: Moles of C_2H_5Br formed = 13.3/109 = 0.12202 Yield = 100 x 0.12202 / 0.17152 = 71.123 = 71.1 (%) Final answer = 71.1% if all values in calculator ECF on 4 (h)(ii) (ignore sf except 1 sf)	Yield > 100 %	**1**

Question Number	Acceptable Answers	Reject	Mark
4 (h) (iv)	Bromine is in excess or All the ethanol is used up	Ethanol limiting reagent	**1**

Question Number	Acceptable Answers	Reject	Mark
4 (h)(v)	Transfer losses or handling losses or specific examples of these (e.g. some product remains in the aqueous layer during separation or in the flask during distillation. Reaction incomplete or Side / competing reactions	Just 'lost' Handling errors Evaporation Equilibrium Named other products of this reaction formed (i.e. phosphoric acid or water) Waste products	**1**

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