edexcel
advancing learning, changing lives

Mark Scheme (Results)
January 2008

GCE

GCE Chemistry (6243) Paper 2

Edexcel Limited. Registered in England and Wales No. 4496750
Registered Office: One90 High Holborn, London WC1V 7BH

A PEARSON COMPANY

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Using the mark scheme

1 / means that the responses are alternatives and either answer should receive full credit.
2 ( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
3 [ ] words inside square brackets are instructions or guidance for examiners.
4 Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.
5 ECF/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- show clarity of expression
- construct and present coherent arguments
- demonstrate an effective use of grammar, punctuation and spelling.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated "QWC" in the mark scheme BUT this does not preclude others.

Penalise incorrect units wherever used

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(a)	From orange to green or blue	 to blue-green or green-blue	Yellow	 1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(b)(i)	Sulphur dioxide/sulphur(IV) oxide/SO_2	Sulfur dioxide Sulfur(IV) oxide		 1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(b)(ii)	any two of Butan-1-ol or $CH_3CH_2CH_2CH_2OH$ (1) Butan-2-ol or $CH_3CH(OH)CH_2CH_3$ (1) 2-methylpropan-1-ol or $(CH_3)_2CHCH_2OH$ (1) or Full structural formulae	 C_2H_5 for CH_3CH_2 Partial names with correct formulae methylpropan-1-ol Penalise full structural formulae without H's once only in (b)(ii) and (iii) Penalise incorrect linkage (e.g. C-H-O) once in (b)(ii) and (b)(iii)	 Butanol p-alcohol s-alcohol	 2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(b)(iii)	2-methylpropan-2-ol OR full structural formula	$(CH_3)_3COH$ methylpropan-2-ol Penalise full structural formulae without H's once only in (b)(ii) and (iii) Penalise incorrect linkage once in (b)(ii) and (b)(iii)		 1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(c)(i)	Nitrate or NO_3^- OR Nitrite or NO_2^-	nitrate(V OR nitrate(III)	NO_3 and NO_2	 1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(c)(ii)	Ammonia/NH_3 ECF on NH_4^+ only			1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(c)(iii)	(gas) turns (damp red) litmus blue No ECF, not standalone	White smoke with HCl (Universal) indicator/pH paper goes blue	White fumes or white mist	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1.(d) **Q** **W** **C**	Dip a nichrome or platinum or flame-testing wire or silica rod (1) in (conc.) hydrochloric acid then the solid and then into a (hot Bunsen) flame. (1) Lithium (gives) crimson (flame) (1) Sodium (gives) yellow (flame) (1)	Dissolve salt in HCl and then put in flame carmine or red or magenta or scarlet orange	Spatula chromium (wire) glass rod Into yellow or luminous (Bunsen) flame Heat	4

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2.(a) **Q** **W** **C**	(Transfer solid to a beaker &) dissolve in distilled or deionised water (1) Use of volumetric flask (1) Add washings from **weighing bottle** (and beaker) (1) Make up solution to the mark (1) Mix **final** solution (1) If dissolved in 250 cm^3 **3 max** rinse weighing bottle (1) Use of volumetric flask (1) Mix **final** solution (1)]	Dissolve in volumetric flask rather than beaker Standard or graduated flask Rinse weighing bottle to 250 cm^3 or line Invert flask	Just 'water' Flask Up to the meniscus	5

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2.(b)	M_r (Na_2CO_3) = 106 (1) Amount (Na_2CO_3) = $\frac{2.45}{106}$ Conc. = $\frac{2.45}{106} \div 0.250$ (1) = 0.0925 (mol dm^{-3}) (1) *Answer must be to 3* SF	ECF for wrong M_r or amount Correct answer with some working 0.0924 and ECF		3

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2.(c)(i)	From yellow to orange	Yellow to salmon pink Yellow to peach	Pink alone and any other colours	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2.(c)(ii)	$\frac{(28.60 + 28.70)}{2}$ = 28.65 (cm^3)	Correct answer without working	28.80 and 28.7 (cm^3)	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2.(c)(iii)	Amount of Na_2CO_3 = 0.0925 x $\frac{25.0}{1000}$ (1) Moles HCl in titre = 2 x 0.0925 x $\frac{25.0}{1000}$ (1) Conc HCl = $\frac{2 \times 25.0 \times 0.0925}{28.65 \text{ or value from (ii)}}$ = 0.161 (mol dm^{-3}) (1) [*Penalise 1 SF only)*] If alternative conc used: Amount of Na_2CO_3 = $\frac{1.50 \times 25.0}{1000}$ (1) Moles HCl in titre = 2 x 1.50 x $\frac{25.0}{1000}$ (1) Conc. HCl = $\frac{2x25.0x1.50}{28.65 \text{ or value from(ii)}}$ = 2.62 (mol dm^{-3}) (1)	Correct answer with some working and ecf ('M' for mol dm^{-3})		3

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(a)(i)	Reaction exothermic or Reactants might evaporate	Prevent oxidation of HBr or Br^- (to bromine or Br_2)	Vigorous or violent or Side reactions occur	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(a)(ii)	Heated round or pear-shaped flask (1) Correct vertical condenser inc. water direction (1) Gas-tight joint & open apparatus (1)	↑ Heat Horizontal lines on flask (at joint) Just arrows to indicate water direction	Just ↑ or just 'heat' or direct heating with a Bunsen or conical flask Horizontal lines at the top of condenser Distillation	3

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(a)(iii)	Immiscible (with water) or do not mix	Immiscible with aqueous solution Insoluble in water	"Different densities" on its own	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(a)(iv)	Drying agent or to dry product	To remove water	Dehydrate or Dehydrating agent	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(a)(v)	**Either** Use electrical heater or sand bath (1) 1-bromopropane is flammable (1) **Or** wear gloves (1) 1-bromopropane harmful by skin absorption (1) 2nd mark conditional on 1st	Water bath Flammable mixture OR propan-1-ol flammable sulphuric acid corrosive (1)	Keep away from naked flame as 1-bromopropane is flammable Organic liquids flammable 1-bromopropane is harmful to skin	2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(b)(i)	Moles propan-1-ol = $\frac{7.55}{60.0}$ (1) Mass 1-bromopropane = $\left(123 \times \frac{7.55}{60.0}\right)$ = 15.5 g (1) IGNORE SF	7.55 x $\frac{123}{60.0}$ = 15.5 g scores full marks Correct answer with some working	15.4 (from 7.5/60 or truncated)	2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(b)(ii)	100 x 8.3 ÷ 123 x $\frac{7.55}{60.0}$ = 53.6 % IGNORE SF	100 x $\frac{8.3}{15.5}$ = 53.5% ECF	Yield > 100%	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3.(b)(iii)	Transfer losses or other products formed or side reactions or (reaction) not complete		Experimental error or spillages Evaporation (from reflux)	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4.(a)(i)	To determine the (minimum) volume of acid needed (for complete neutralisation of the alkali)	Amount of acid needed To ensure equal moles of acid & alkali used	To find [HCl]	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4.(a)(ii)	Temperature equilibration or steady temperature	Same or settled or room temperature		1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4.(b)(i)	Mass = 25 + 22.75 = 47.75 (1) or in equation below 47.75 x 4.18 x 10.5 = 2096 (J) (1) (=2100 (J)) consequential on calculated mass	Correct answer with some working (2) Use of incorrect mass (e.g. m = 1 g) can gain 2nd mark Answer changed to kJ		2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4.(b)(ii)	Moles (water)= $\frac{25 \times 1.5}{1000}$ = 0.0375 (1) $\triangle H = (-)\frac{2096}{(1000 \times .0375)}$ (1) $= -55.9$ (kJ mol^{-1}) (1) both value, in kJ mol^{-1}, and sign needed [ignore SF]	Correct answer -55.9 or -56.0 kJ mol^{-1} with some working (3) $\triangle H = (-)\frac{2100}{(1000 \times .0375)}$ (1) $= -56.0$ (kJ mol^{-1})(1) scores full marks Conversion to kJ can be at final stage		3

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4.(c)	Any one of No heat is lost (to the surroundings) OR Polystyrene cup or thermometer have negligible heat capacity OR All the acid was transferred (from the beaker) to the polystyrene cup	Takes up negligible heat		1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
5. **Q** **W** **C**	Stated volume (25 – 100 cm^3) or equal volume (of solutions) **used in each reaction** (1) Calculated mass or equal mass of **Mg used in each reaction** (1) Mix and **stir** (1) Measure initial and final temperature (1) Bigger $\triangle T$ (therefore bigger $\triangle H$), therefore bigger **difference** in reactivity (1)	10 –150 cm^3 amount Temperature rise OR highest temperature References to specific reaction(s) (but these must be correct) e.g. biggest ΔT with $CuSO_4$ or smallest ΔT with $Zn(NO_3)_2$	Just 'excess Mg'	5