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IGCSE Chemistry 4437 / 5H
Mark Scheme (Final)
November 2007

IGCSE

IGCSE Chemistry (4437/5H)

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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.

Question Number	Question		
1	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) C / F **(ii)** A **and** B **(iii)** E **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
1	**(b)**		
	Acceptable Answers	Reject	Mark
	Poly(()ethene()). Accept polythene/Polyethylene correct repeat unit H | —C— | H Or any multiple length (2 + carbons) continuation bonds ___ ____ or ….. ….. (only if first mark awarded) **Notes** Ignore 'brackets' and 'n' or other subscripts		**(1)** **(1)** **(1)**

Total 6 marks

Question Number	Question		
2	**(a)**		
	Acceptable Answers	Reject	Mark
	<table><tr><th>Particle</th><th>Relative mass</th><th>Relative charge</th></tr><tr><td>Electron</td><td>1/1840 1/2000 1/1850 1/1836</td><td>-1</td></tr><tr><td>Neutron</td><td></td><td>0 / nil</td></tr><tr><td>Proton</td><td>1</td><td></td></tr></table> **Notes** Ignore negligible	0 for mass	**(4)**

Question Number	Question		
2	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) helium /carbon / nitrogen / oxygen / neon / magnesium / silicon / sulphur / calcium (ii) silicon (iii) hydrogen **Notes** Max penalty 1 if give symbols for all 3 rather than names		**(1)** **(1)** **(1)**

Question Number	Question		
2	**(c)**		
	Acceptable Answers	Reject	Mark
	7 **Notes**		**(1)**

Question Number	Question		
2	**(d)**		
	Acceptable Answers	Reject	Mark
	(i) full / complete ignore saturated (ii) unreactive/inert/do not undergo reactions **Notes**		**(1)** **(1)**

Total 10 marks

Question Number	Question		
3	**(a)**		
	Acceptable Answers	Reject	Mark
	zinc is less reactive than magnesium Magnesium is more reactive than Zinc **Notes** Or correct reference to positions in reactivity series	It is more reactive	**(1)**

Question Number	Question		
3	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$ reagents products **Notes** incorrect balancing = **-1** be generous with cases **(ii)** (dark) grey **(1)** to pink-brown **(1)** blue **(1)** to green **(1)** **Notes** Ignore additional information		**(1)** **(1)** **(2)** **(2)**

Question Number	Question		
3	**(c)**		
	Acceptable Answers	Reject	Mark
	hydrogen more reactive than copper hydrogen less reactive than iron **Notes** Hydrogen between Fe + Cu for both marks	Iron(II) or Copper (II)	**(1)** **(1)**

Total 9 marks

Question Number	Question		
4	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) shared electron pair all other electrons correct (ignore inner shells even if wrong) **(ii)** bottom box crossed **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
4	**(b)**		
	Acceptable Answers	Reject	Mark
	same number of electrons / same electronic configurations 'Same protons' negates **Notes**		**(1)**

Question Number	Question		
4	**(c)**		
	Acceptable Answers	Reject	Mark
	add sodium hydroxide (solution)/ammonia solution/ ammonium hydroxide green ppt/solid/suspension Orange/brown/orange-brown/foxy brown/rusty brown/red-brown ppt/ solid/suspension **Notes** If miss out ppt then give 1 mark for 2 correct colours result marks only given if test correct	Powder/crystals/bits Orange/rusty/red	**(1)** **(1)** **(1)**

Total 7 marks

Question Number	Question		
5	**(a)**		
	Acceptable Answers	Reject	Mark
	(X) chlorine / Cl_2 (Y) sodium / Na (Z) aluminium / Al **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
5	**(b)**		
	Acceptable Answers	Reject	Mark
	Y and Z / Na and Al **Notes**		**(1)**

Question Number	Question		
5	**(c)**		
	Acceptable Answers	Reject	Mark
	yellow **Notes**		**(1)**

Question Number	Question		
5	**(d)**		
	Acceptable Answers	Reject	Mark
	burns with a squeaky pop **Notes**		**(1)**

Question Number	Question		
5	**(e)**		
	Acceptable Answers	Reject	Mark
	(products) $Z_2(SO_4)_3$ + H_2O (balancing) - 3 - 3 **Notes**		**(1)** **(1)**

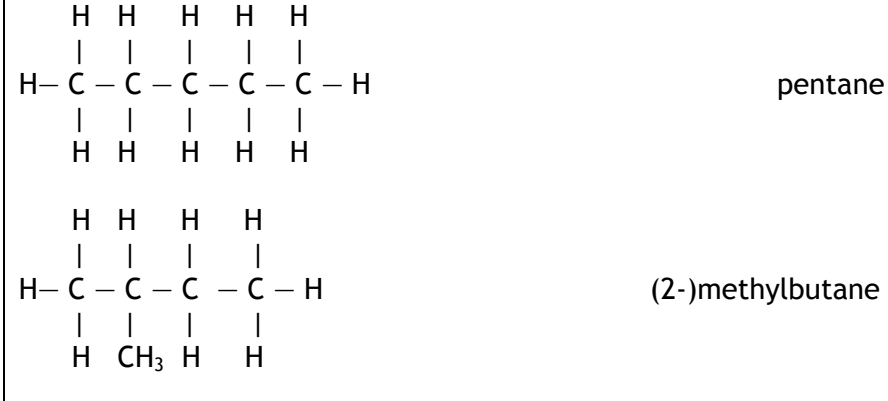
Total 8 marks

Question Number	Question		
6	**(a)**		
	Acceptable Answers	Reject	Mark
	C_nH_{2n+2} **Notes**		**(1)**

Question Number	Question		
6	**(b)**		
	Acceptable Answers	Reject	Mark
	similar chemical properties / same functional group gradation in physical properties neighbouring members differ by CH_2 **Notes** Max 2		**(2)**

Question Number	Question		
6	**(c)**		
	Acceptable Answers	Reject	Mark
	no double bonds / only single bonds **Notes**		**(1)**

Question Number	Question		
6	**(d)**		
	Acceptable Answers	Reject	Mark
	contains oxygen / not just carbon and hydrogen **Notes**		**(1)**

Question Number	Question		
6	**(e)**		
	Acceptable Answers		Mark
	 pentane (2-)methylbutane  (2,2-)dimethylpropane **Notes** (any two structures and matching names for 1 each)		**(4)**

Total 9 marks

Question Number	Question		
7	**(a)**		
	Acceptable Answers	Reject	Mark
	ammonia hydrogen chloride **Notes**		**(1)** **(1)**

Question Number	Question		
7	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) ammonia **(ii)** NH_4^+ **(iii)** $NH_4Cl + NaOH \rightarrow NaCl + H_2O + NH_3$ reactants products **Notes**		**(1)** **(1)** **(1)** **(1)**

Question Number	Question		
7	**(c)**		
	Acceptable Answers	Reject	Mark
	(i) silver chloride **(ii)** Cl^- **(iii)** (products) $AgCl + NH_4NO_3$ (state symbols) aq aq s aq **Notes**		**(1)** **(1)** **(1)** **(1)**

Total 10 marks

Question Number	Question		
8	**(a)**		
	Acceptable Answers	Reject	Mark
	2,7 2.8 **Notes**		**(1)** **(1)**

Question Number	Question		
8	**(b)**		
	Acceptable Answers	Reject	Mark
	(ion) 2 and 8 • or × shown on diagram 2+ shown **Notes**		**(1)** **(1)**

Question Number	Question		
8	**(c)**		
	Acceptable Answers	Reject	Mark
	F_2 / fluorine gains electrons **Notes**		**(1)** **(1)**

Question Number	Question		
8	**(d)**		
	Acceptable Answers	Reject	Mark
	positive and negative ions / oppositely charged ions **Notes**		**(1)**

Question Number	Question		
8	**(e)**		
	Acceptable Answers	Reject	Mark
	fluorine (molecules) attracted by (weak) intermolecular forces which are (much) weaker than ionic bonds/bonds in MgF_2 **Notes**		**(1)** **(1)**

Question Number	Question		
8	**(f)**		
	Acceptable Answers	Reject	Mark
	(i) 100 – (78.6 + 10.1) = 11.3 **(ii)** (24 × 0.786) + (25 × 0.101) + (26 × .113) = 24.3 **Notes**		**(1)** **(1)** **(1)**

Total 12 marks

Question Number	Question			
9	**(a)**			
	Acceptable Answers		Reject	Mark
	decreases increases **Notes**	increases no change		**(4)**

Question Number	Question		
9	**(b)**		
	Acceptable Answers	Reject	Mark
	rate increases (reactant) particles closer together/more particles in given volume molecules/particles collide more frequently/ more collisions per second **Notes** If no mention of particles/molecules max 1 for explanation	Rate same/rate decreases = 0/3 atoms	**(1)** **(1)** **(1)**

Question Number	Question		
9	**(c)**		
	Acceptable Answers	Reject	Mark
	recycled / put back into reactor **Notes**	Used again	**(1)**

Question Number	Question		
9	**(d)**		
	Acceptable Answers	Reject	Mark
	(i) oxidation / redox/ accept exothermic **(ii)** $2NO + O_2 \rightarrow 2NO_2$ all formulae correct balancing **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
9	**(e)**		
	Acceptable Answers	Reject	Mark
	NH_4NO_3 **Notes**		**(1)**

Question Number	Question		
9	**(f)**		
	Acceptable Answers	Reject	Mark
	phosphorus potassium **Notes**	Phosphate	**(1)** **(1)**

Total 14 marks

Question Number	Question		
10	**(a)**		
	Acceptable Answers	Reject	Mark
	nitric acid $KOH + HNO_3 \rightarrow KNO_3 + H_2O$ **Notes**		**(1)** **(1)**

Question Number	Question		
10	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) (K_2O) $M_r = 94$ (KOH) $M_r = 56$ **(ii)** ($18.8 \div 94 = 0.20$ mol $(0.20 \times 2 \times 56 =) 22(.4)$ (g) (answer of 11(.2) scores 1) **Notes**		**(1)** **(1)** **(1)** **(1)**

Question Number	Question		
10	**(c)**		
	Acceptable Answers	Reject	Mark
	$RbOH + HCl \rightarrow RbCl + H_2O$ **Notes**		**(1)**

Total 7 marks

Paper total 90 marks