

Mark Scheme (Results) January 2011

GCE O

O Level Chemistry (7081) Paper 01

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7081/01 O-LEVEL CHEMISTRY MARK SCHEME - JANUARY 2011

Question 1		
	CaBr ₂	(1)
	ammonium nitrate	(1)
	Na ₂ SO ₃	(1)
	Cu ₂ O	(1)
	lead(IV) oxide/lead dioxide	(1)
	Fe ₂ (SO ₄) ₃	(1)
		(6)
Total 6 marks		

Question 2		
(a)	pink / (from) blue to pink	(1)
(b)	purple/violet	(1)
(c)	yellow	(1)
(d)	white	(1)
(e)	brown/red-brown	(1)
(f)	white	(1)
		(6)
Total 6 marks		

Question 3		
(a)	carbon dioxide/CO ₂ Allow ozone/O ₃	(1)
(b)	magnesium oxide/MgO	(1)
(c)	calcium carbonate/CaCO ₃	(1)
(d)	carbon monoxide/CO or nitrogen oxide/nitrogen(II) oxide/nitric oxide/nitrogen monoxide / NO or hydrogen chloride	(1)
(e)	calcium	(1)
(f)	sodium hydroxide/NaOH or potassium hydroxide/KOH	(1)
(g)	oxygen/O ₂	(1)
		(7)
Total 7 marks		

Question 4		
(a)	2,8,5	(1)
(b)	selenium/Se	(1)
(c)	4	(1)
(d)	argon/Ar	(1)
(e)	rubidium/caesium/francium/Rb/Cs/Fr	(1)
(f)	ionic	(1)
		(6)
Total 6 marks		

Question 5		
(a)	14	(1)
(b)	10	(1)
(c)	20	(1)
(d)	2	(1)
(e)	3	(1)
(f)	0.125 or $\frac{1}{8}$	(1)
		(6)

Total 6 marks

Question 6		
(a)	solid: all particles touching	(1)
	orderly arrangement	(1)
	liquid: groups of particles touching (mainly 3 or more particles) and	(1)
	groups randomly arranged	(1)
	groups close to other groups (allow some order)	(1)
	or	(1)
lots of particles touching (with some spacing)	(1)	
some randomness (but may be some order)		
gas: particles well spaced		(1)
	random distribution	(1)
		(6)
(b)	ice to water: particles (or molecules) need to be loosened/intermolecular forces need to be partially overcome	(1)
	water to steam: particles have to be completely separated/intermolecular forces have to be completely overcome	(1)
	(Not 'bonds break' unless hydrogen bonds)	
		(2)

Total 8 marks

Question 7			
(a) (i)	$2\text{Al} + 3\text{Cl}_2 \rightarrow 2\text{AlCl}_3$	formulae balance	(1) (1) (2)
(ii)	$3\text{NaOH} + \text{Fe}(\text{NO}_3)_3 \rightarrow \text{Fe}(\text{OH})_3 + 3\text{NaNO}_3$	formulae balance balance	(1) (1) (2)
(iii)	$2\text{KOH} + \text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + 2\text{H}_2\text{O}$	formulae balance balance	(1) (1) (2)
(b)	$\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$ (ignore state symbols)		(1) (1)

Total 7 marks

Question 8		
(a)	oxidation is gain of oxygen/loss of electrons/increase in oxidation state / loss of hydrogen	(1) (1)
(b) (i)	Mg is oxidised because of loss of electrons/increase in oxidation state	(1)
(ii)	Ag^+ is reduced because of gain of electrons/ Ag^+ decrease in oxidation state (of silver)/silver(or Ag / Ag^+) oxidation state goes from +1 to 0	(1) (2)
(c)	red-brown/brown/pink layer (of copper) formed (on magnesium) blue colour (of solution) fades/disappears/solution goes colourless	(1) (1) (2)

Total 5 marks

Question 9		
(a) (i)	N.B. question states 'use a line to represent a covalent bond'. 3 bonds from N to H correct pyramidal shape	(1) (1) (2)
(ii)	two double bonds from C to O linear shape	(1) (1) (2)
(b) (i)	nitrogen: electrons in triple bond shown correctly other electrons shown correctly oxygen: electrons in double bond shown correctly other electrons shown correctly	(1) (1) (1) (1) (4)
(ii)	nitrogen has triple bond but oxygen has double bond triple bond stronger than double bond/so harder to break/more energy needed to break it Allow 1 mark for 'nitrogen has triple bond which requires high energy/high temperature to break/is very hard to break Mark (ii) independently of the answer in (i)	(1) (1) (2)

Total 10 marks

Question 10

(a)	(i)	same number of protons same number of electrons	(1) (1) (2)
	(ii)	different numbers of neutrons/one has 30 neutrons and one has 32	(1) (1)
	(iii)	isotopes	(1) (1)
(b)		^{56}Fe has the same number of neutrons	(1) (1)
(c)		same electron configuration/same number of outer shell electrons/same number of electrons	(1) (1)
(d)		delocalised electrons / sea of electrons / cloud of electrons (if linked to movement of electrons) electrons can move	(1) (1) (2)

Total 8 marks

Question 11		
(a) (i)	moles: C = 38.4/12 H = 4.8 Cl = 56.8/35.5 3.2 4.8 1.6 ∴ 2 : 3 : 1	(1) (1) (2)
(ii)	$C_2H_3Cl = 24 + 3 + 35.5 = 62.5$ (hence formula is C_2H_3Cl)	(1) (1)
(iii)	displayed formula for C_2H_3Cl (allow t.e. if $C_4H_6Cl_2$ in (ii))	(1) (1)
(iv)	polymer chain (any length) with extension bonds at each end	(1) (1)
(v)	heat/high temperature/elevated temperature or temperature in range 50-300C pressure or in range 10-2000 atm catalyst or (if specified) O_2 /peroxide/chromium oxide/organo-metallic or Ziegler/Natta catalyst	(1) (1) (1) (3)
(b)	$HOOC(CH_2)_4COOH$ $H_2N(CH_2)_6NH_2$ Allow $NH_2(CH_2)_6NH_2$	(1) (1) (2)

Total 10 marks

Question 12		
(a)	(faint) pink/colourless to pink	(1) (1)
(b)	plot of results all correct = 2 (-1 for each error) identity of erroneous point straight line of best fit	(2) (1) (1) (4)
(c) (i)	0.52 g (allow ± 0.02)	(1) (1)
(ii)	moles NaOH = $0.025 \times 0.400 = 0.010$ moles H ₂ X = 0.005 <i>allow t.e.</i> $M_r(\text{H}_2\text{X}) = 0.52/0.005$ <i>allow t.e. from (c)(i)</i> = 104	(1) (1) (1) (1) (4)
(iii)	$M_r(\text{A}) = 104$ $M_r(\text{B}) = 118$ (acid is A)	(1) (1) (2)

Total 12 marks

Question 13		
(a)	flame test (or description) NaCl: yellow flame KCl: lilac flame (allow pink)	(1) (1) (1) (3)
(b)	named indicator colour for ammonia colour for sulphur dioxide Or <u>conc.</u> HCl/ <u>conc.</u> hydrochloric acid or hydrogen chloride/HCl white fumes with ammonia no reaction with sulphur dioxide Or add potassium dichromate/potassium manganate(VII) (or permanganate) no reaction with ammonia turns (orange to) green or (purple to) colourless	(1) (1) (1) (1) (1) (1) (1) (1) (1) (3)
(c)	allow any acid e.g. HCl/HNO ₃ /H ₂ SO ₄ <i>Note: do not give a mark for concentrated H₂SO₄ but allow the marks that follow. Concentrated HCl and HNO₃ are correct. If just 'add acid', allow 2nd and 3rd marks.</i> MgO: no bubbles (of gas)/does not fizz/just dissolves (not 'no reaction') MgCO ₃ : bubbles/fizzes/effervesces Or acids as above + use of lime water (mentioned here or later) MgO: no bubbles (of gas)/does not fizz/just dissolves (not 'no reaction') MgCO ₃ : gas evolved turns lime water milky, etc. Or Heat Mg: no reaction Mg CO ₃ : gas evolved turns lime water milky	(1) (1) (1) (1) (1) (1) (1) (1) (3)

Total 9 marks
TOTAL FOR PAPER: 100 MARKS

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