OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

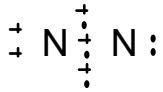
CHEMISTRY B (SALTERS) F331 MS

Unit F331: Chemistry for Life

Specimen Mark Scheme

The maximum mark for this paper is **60**.

Question Number	Answer	Max Mark
1(a)(i)	53; 78; 53 respectively	[1]
(ii)	Same atomic no./protons (1); different mass no./ neutrons (1)	[2]
(iii)	+2; low/small (1); -1; aluminium/lead (1) (one mark for each column)	[2]
(iv)	average/mean of isotopes (1)	[1]
1(b)(i)	use small doses (1); therefore limited exposure (1)	[2]
(ii)	10,000 to 500 = 5 half-lives (1); 5 x 8days = 40 days (1)	[2]
1(c)	most of atom empty space/very low density electrons allowing particles to pass undeflected(1); positive protons in nucleus (1) deflect α-particles a lot(1) AW	[3]
	Total	[13]
2(a)	exothermic	[1]
2(b)	$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$ correct equation(1); state symbols(1)	[2]
2(c)	Energy transferred = 250 x 4.2 x 50 (52,500J)(1); moles CaO = 10/56(0.179)(1); energy per mole = 52500/0.179(293.3kJ)(1); 290 (sig fig mark)(1) allow ecf's	[4]
2(d)(i)	hard to prevent calcium hydroxide dissolving as it is formed	[1]
(ii)	energy change is independent of route (AW) (1); $\Delta H = \Delta H_1 - \Delta H_2$ (1)	[2]
2(e)	Mg in same group(1); therefore would expect similar reactivity of elements/compounds(1)	[2]
	Total	[12]
3(a)	CO – partial/incomplete combustion(1); SO_x – combustion of sulfur impurities/atoms in fuel(1); hydrocarbons – unburnt fuel(1);	[3]
(b)	branched; cycloalkane; straight; arene; four correct 2 marks; 2/3 correct 1 mark	[1]

Question Number	Answer	Max Mark
(c)	Any **five** from the following: Reactants *adsorb* on catalyst surface (1) *: must be spelled correctly* Bonds in reactants weaken and break (1) New/product bonds form (1) Products diffuse away from surface (1) coke bonds to surface (1) more strongly/irreversibly/coats or blocks surface(1)	**[5]**
(d)(i)	one of: renewable; non-toxic; biodegradable; lower emissions	**[1]**
(ii)	entropy increases(1); more ways of arranging/more disorder when mixed (1); than when separate(1) ;	**[3]**
(iii)	oxygenates	**[1]**
(iv)	 lone pairs(1); six bonding electrons(1); triple bond (1); high bond enthalpy/very strong (1);	**[4]**
	Total	**[19]**
4(a)(i)	1. F (1) and 2. E (1) respectively	**[2]**
(ii)	Lines in exactly the same position (1);	**[1]**
(b)(i)	(H_2S) lone pair (two **dots**) (1); (NH_3) lone pair (1); OCS (two dots /two crosses) (1)	**[3]**
(ii)	H_2S (bent); NH_3 (trigonal pyramid); OCS (linear) (one mark each) (3)	**[3]**
(iii)	wedge: bond sticking out of paper dotted, behind paper (1)	**[1]**
(c) (i)	accelerated by an electric field/charged plates (1) time depends on mass (1)	**[2]**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Max Mark</th></tr>
<tr><td>(ii)

(iii)</td><td>Peak at 720(1); must be sixty carbon atoms (12 x 60 = 720) (1);

<table>
<tr><th>property</th><th>diamond</th><th>graphite</th><th>C_{60}</th><th>supports simple molecular model</th></tr>
<tr><td>density/g cm^{-3}</td><td>3.52</td><td>1.9–2.3</td><td>1.69</td><td></td></tr>
<tr><td>hardness scale
(hardest 10 – softest 1)</td><td>10</td><td>1–2</td><td>1–2</td><td></td></tr>
<tr><td>melting point/^{o}C</td><td>3550</td><td>3652–3697</td><td>sublimes around 800</td><td>√</td></tr>
<tr><td>solubility</td><td>insoluble</td><td>insoluble</td><td>soluble in organic solvents</td><td>√</td></tr>
</table>
</td><td>[2]

[2]</td></tr>
<tr><td></td><td>Total</td><td>[16]</td></tr>
<tr><td colspan="2">Paper Total</td><td>[60]</td></tr>
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