Rewarding Learning

General Certificate of Secondary Education
2012

Science: Double Award (Modular)

Paper 2
Higher Tier

[G8205]

TUESDAY 12 JUNE, MORNING

MARK SCHEME

					AVAILABLE MARKS
1	(a)	(i)	zinc, lead, copper, silver Allow [1] if order correct but reversed	[2]	
		(ii)	displacement allow redox	[1]	
		(iii)	zinc sulphate [1] hydrogen [1]	[2]	
	(b)	(i)	Any **three** from: calcium sinks **or** sinks and rises bubbles/gas evolved/fizzing/gas given off idea of reaction getting faster **not** reaction is fast **not** reaction idea of solution going cloudy allow alkaline solution calcium gets smaller/dissolves/disappears idea of heat given out/exothermic **Ignore** reference to hissing or noise Mark idea of moving across the surface of the water as wrong, mark any idea of flame as wrong Accept moves **in** the water and **not** just moves (3 × [1])	[3]	
		(ii)	calcium hydroxide/limewater	[1]	
		(iii)	fume cupboard/safety screen/eye protection/small amounts (of calcium)	[1]	
	(c)	(i)	white or grey **not** dark grey – dependent on idea of a solid product [1] ash/powder/solid [1]	[2]	
		(ii)	idea that oxygen has been added/gained **or** loss of electrons not simply idea of burning in oxygen **not** loss of hydrogen	[1]	
		(iii)	magnesium oxide [1] hydrogen [1]	[2]	
	(d)	(i)	reaction complete/constant mass	[1]	
		(ii)	carbon dioxide	[1]	
	(e)	(i)	calcium chloride [1], water [1]	[2]	
		(ii)	limewater/calcium hydroxide (solution)	[1]	20

				AVAILABLE MARKS
2	(a)	(i)	hydrogen [1]	
		(ii)	$2Cl^-$ [1] $\rightarrow Cl_2 + 2e^-$ [1] balanced [1] third mark depends on first two [3]	
		(iii)	sodium hydroxide [1]	
	(b)	(i)	9/10 points correct [2]/7/8 points correct [1] curve correct (**not** ruler) [1][3]	
		(ii)	56 ±1cm^3 penalise lack of units [1]	
		(iii)	140 s allow 132s – 140s penalise lack of units apply CM [1]	
		(iv)	90/140 [= 0.64 (cm^3/s) (±0.04)] (i.e. 90/**(b)(iii)** answer) allow 90/140 or equivalent [1]	
	(c)	(i)	84 [1]	
		(ii)	106 [1]	
		(iii)	8.4/84 = 0.1 mole apply CM [1]	
		(iv)	0.05 (moles) apply CM [1]	
		(v)	5.3 (g) apply CM i.e. 106 × answer **(iv)** or answer **(ii)** × answer **(iv)** [1]	16
3	(a)		chlorine: reactive **and** green or yellow-green [1] nitrogen: colourless **and** no (poisonous) [1] helium: lighter **and** unreactive [1] [3]	
	(b)		*Appearance:* Grey/yellow [1] solid (mixture) [1] or grey solid (iron) [1] yellow powder/solid (sulphur) [1] *Safety precaution:* Wear safety goggles/carry out in fume cupboard [1] *Description:* Mixture **glows** when heated [1] Pungent smell [1] e.g. bad, idea of choking, rotten eggs [1] **not** strong smell Continues to glow when removed from heat [1] allow blue flames [1] allow idea of sulphur melting [1] Grey/black solid forms [1] *Product:* Iron sulphide/iron(II) sulphide [1] FeS [1] (7 × [1]) Allow up to [6] for the appearance, safety, and description marks. At least **one** product mark needed for [7]	
			Quality of written communication [1]	
	(c)	(i)	toxic/poisonous gas/stops oxygen getting to body [1] odourless/colourless [1] [2]	
		(ii)	idea of needing good supply air/oxygen for complete combustion **or** other correct e.g. to prevent leaks of carbon monoxide/poisonous gas **or** to prevent incomplete combustion (**not** idea of formation of carbon monoxide) [1]	14

AVAILABLE MARKS

4 **(a)** **(i)** Any **three** of:
he left spaces
elements arranged in order of relative atomic mass **not** mass **not** mass number
idea that it had a relatively small number of elements
elements were arranged in Groups
elements were arranged in Periods
metals were separated from non-metals
or other correct e.g. hydrogen in Group 1
Maximum (3 × [1]) [3]

(ii) Any **three** of:
elements arranged in order of increasing atomic number
more elements/more periods
no spaces
idea of some elements having their position changed
(as long as incorrect answer is not given)
noble gases included
Accept idea of actinides **Accept** lanthanides
transition metals between Group II and Group III or in a block
or other correct e.g. Hydrogen not in group I
Maximum (3 × [1]) [3]

(b)

Element	Group	Period	Electronic structure
potassium	**I** [1]	4	**2,8,8,1** [1]
magnesium	II	**3** [1]	**2,8,2** [1]
sulphur [1]	**VI** or 6 [1]	3	2,8,6

[6]

(c) **(i)** all have same number of electrons in their outer shells/all have one electron in their outer shell [1]

(ii) reactivity increases [1]

(iii) iodine [1]

(iv) decreases [1] then increases [1] then decreases for argon [1] [3]
Allow [1] for decreases but **not** for increase alone

(d) **(i)** magnesium hydroxide **or** magnesium oxide **or** magnesium carbonate [1]

(ii) sulphuric acid [1]

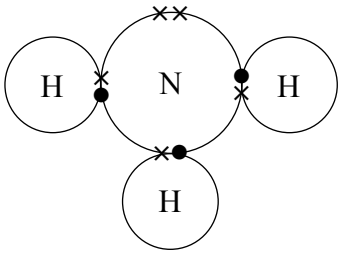
20

AVAILABLE MARKS

5 **(a)** **(i)** idea of shared electrons [1]

(ii) idea of two or more **atoms** [1] (covalently) bonded/joined together [1] [2]

(iii)



correct sharing [1]
all electrons included correctly, second mark dependent on first [1] [2]

(iv) two [1]

(v) bonds/forces **between the molecules** are weak [1]
little energy needed to break bonds/forces [1] [2]

(b) **(i)** diagram to show:
regular arrangement [1]
metal **cations** given positive charge – no negative ions [1]
idea of delocalised electrons [1]
labels [1] at least 2 labels correct [4]

(ii) can be drawn into wires [1]

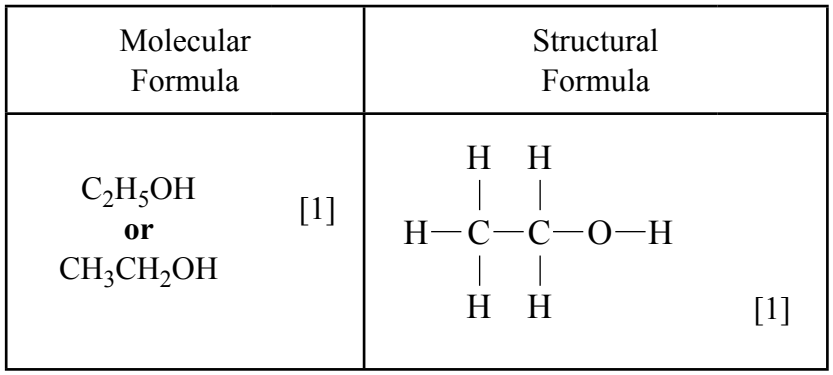
(iii) layers of metal **ions/atoms** [1] can slide over one another [1] [2]

(iv) malleable/high melting point/good conductor of heat/lustrous/sonorous/hard/dense/strong
not low density, **not** conductor of electricity [1]

(c) **(i)** idea it can be heated and remoulded [1]

(ii) diagram showing at least 3 long chain molecules [1] with cross links in between [1] [2]

(iii) Bakelite [1] 20

					AVAILABLE MARKS
6	**(a)**	**(i)**	hydrogen and carbon (both needed)	[1]	
		(ii)	alkane	[1]	
		(iii)	Any **two** of: same general formula same/similar chemical properties gradation in physical properties **not** similar physical properties accept same functional group/which differ by a CH_2 group (2 × [1])	[2]	
	(b)	**(i)**	steam/H_2O (**not** water)	[1]	
		(ii)	fermentation **or** anaerobic respiration of yeast	[1]	
		(iii)			
			If both correct but wrong way round award [1]	[2]	
		(iv)	idea that ethanol does not contain **only** hydrogen and carbon atoms/ also contains oxygen atom	[1]	
		(v)	$C_2H_5OH + 3O_2$ [1] → $2CO_2 + 3H_2O$ [1] balanced [1] third mark depends on first two	[3]	
	(c)	**(i)**	pH 3–6	[1]	
		(ii)	**black** solid [1] reacts to form blue solution [1] **or** colourless solution [1] turns blue [1] **or** black solid [1] disappears/dissolves [1] (2 × [1])	[2]	
			copper ethanoate [1] or copper II ethanoate	[1]	
	(d)	**(i)**	ethanoic acid + ethanol → ethyl ethanoate + **water**	[1]	
		(ii)	**colourless** [1] odourless **liquid** [1] solid green white orange gas **sweet-smelling** [1]	[3]	20
				Total	**110**