Rewarding Learning

General Certificate of Secondary Education
2012

Science: Chemistry

Paper 1
Foundation Tier

[G1401]

TUESDAY 12 JUNE, MORNING

MARK SCHEME

AVAILABLE MARKS

1 **(a)** **(i)**

Element	Atomic number	Metal or Non-metal
Carbon	6	non-metal [1]
Tin	50	metal [1]
Lead	82	metal [1]

[1] each row [3]

(ii) substance which consists of one type of atom [2]
or substance which **cannot be broken down into anything simpler** [1]
by chemical means [1] [2]

(iii) number of protons [1]

(b) **(i)**

Isotope	Number of protons	Number of electrons	Number of neutrons
^{12}C	6	6	6
^{13}C	6	6	7
^{14}C	6	6	8

[1] for each column [3]

(ii) atoms of the same element/same atomic number/same number of protons [1]
different number of neutrons/different mass number [1] [2]

(c) **(i)** different forms/structures of the same element [1]
in the same (physical) state [1] [2]

(ii) 2,8,1 [1]
2,8,7 [1]
Na^+ [1] 2,8 [1]
Cl^- [1] 2,8,8 [1]
ions held by attraction between opposite charges [1] Maximum [6]

19

2 **(a)** **(i)** $2Na + Cl_2 \rightarrow 2NaCl$ [3]

(ii) white [1] crystalline [1] solid [1] Maximum [2]

(iii) shiny/grey [1]

(iv) goes dull/tarnishes [1]

(v) under/in oil [1]

(b) **(i)** lower density **than** water [1]

(ii) (the sodium) melts [1]

					AVAILABLE MARKS
		(iii)	sodium hydroxide/OH^-/hydroxide ions produced [1] alkaline [1] solution	[2]	
		(iv)	$2Na + 2H_2O \rightarrow 2NaOH + H_2$	[3]	15
3	**(a)**	**(i)**	carbon dioxide [1] low [1] citric acid/ascorbic acid/carbonated water [1]	[3]	
		(ii)	Solute = solid which dissolves	[1]	
			Solubility = mass [1] of solid which saturates [1] **100 g water** [1] at a particular temperature [1] allow idea of **maximum** mass for saturate	[4]	
		(iii)	Increasing solubility with increasing temperature	[1]	
	(b)	**(i)**	water which does not lather with soap [1] water which does not lather readily with soap [2]	[2]	
		(ii)	B [1] contains largest calcium and/or magnesium ion concentration/mass [1]	[2]	
		(iii)	equal volumes of mineral water [1] **add soap and shake** [1] most soap for lather/most scum/least or no lather = hardest water [1]	[3]	
			Quality of written communication	[2]	
		(iv)	pH paper/Universal Indicator [1] compare to colour chart [1]	[2]	
		(v)	C [1] lowest pH [1]	[2]	
		(vi)	any compound containing one positive and one negative ion from the lists below: positive ions: calcium/magnesium/sodium/potassium negative ions: hydrogen carbonate/chloride/sulphate/nitrate [1] correct formula of named compound [1]	[2]	24

			AVAILABLE MARKS
4	(a)	any **two** from: natural gas, LPG, petrol, diesel, paraffin, candlewax, peat, lignite, coke, coal — Maximum [2]	
	(b) (i)	contains **only** [1] **carbon and hydrogen** [1] — [2]	
	(ii)	any **two** from: global warming ice caps melt flooding rise in sea level climate change — [2]	
	(c) (i)	carbon monoxide [1] water [1] — [2]	
	(ii)	11 — [1]	
	(d) (i)	reaction [1] of a substance/fuel with oxygen [1] forming oxides [1] releasing energy [1] — Maximum [3]	
	(ii)	can be replaced [1] in a limited period of time [1] — [2]	
	(e) (i)	$2H_2 + O_2 \rightarrow 2H_2O$ — [3]	
	(ii)	produces water/product is non-polluting — [1]	18
5	(a)	Mendeleev [1] Newlands [1] mass [1] octaves [1] periods [1] — [5]	
	(b) (i)	caesium — [1]	
	(ii)	fluorine — [1]	
	(iii)	bromine — [1]	
	(iv)	oxygen/neon/argon/xenon/krypton/radon — [1]	
	(v)	full outer shell of electrons — [1]	

			AVAILABLE MARKS
(c)	**(i)** solid	[1]	
	(ii) 7	[1]	
	(iii) 1–/–	[1]	
	(iv) HAt	[1]	14
		Total	**90**