IGCSE-CHEMISTRY

SET-1 (MS)

Subject	**Chemistry**
Paper Code	0620
Paper	4
Marks	80
Duration	1hr 15 Mins
Topics	1. States of Matter 2. Atoms, Elements, and Compounds 3. Periodic Table 4. Behaviours of Metals 5. Metallurgy

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POINTS

1.

(a)	Cl_2 / chlorine	1
(b)	SO_2 / sulfur dioxide	1
(c)	Cu / copper	1
(d)	Ar / argon	1
(e)	$Ca(OH)_2$ / calcium hydroxide	1
(f)	V_2O_5 / vanadium(V) oxide	1

2.

(a)	calcium / Ca	1
(b)	7	1
(c)	4	1
(d)(i)	radioisotopes	1
(d)(ii)	^{286}Fl 114p 172n 114e	1
	^{289}Fl 114p 175n 114e	1

3.

(a)(i)	M1 Melting M2 Condensing M3 Freezing M4 Sublimation	4
(a)(ii)	No new substances are made **or** The change can be reversed (by a physical process)	1
(a)(iii)	Boiling happens at a specific temperature **or** Evaporation happens over a range of temperatures	1
(b)	M1 Separation: Touching M2 Arrangement: Regular M3 Movement: Vibrate	3
(c)	$4X + O_2 \rightarrow 2X_2O$ M1 Species M2 Balance	2

4.

(a)	80(°C) (1)	1
(b)	horizontal line from end of graph at minute 9 to minute 11 (1)	1
(c)	energy is used to break bonds / overcome attraction (1) between molecules (1)	2

(d)	vibrations (1) increase (1)	2
(e)	melting point decreases (1) boiling point increases (1)	2
(f)	decrease from 120 °C to 80 °C and horizontal line at 80 °C (1) decrease from horizontal line to finish at 20 °C at 8 mins (1)	2

POINTS

5.

	particles / number of protons / number of electrons / number of neutrons / number of nucleons 12 (1) 17 (1) / 18 (1) / 37 (1) Fe (1) 2+ (1)	6

6.

(a)	2 : 8 : 8 : 2	1
(b)(i)	M1 Same number of (**or** 2) outer electrons	2
(b)(ii)	M2 (Sr has) outer electrons are in the 5th shell	

7.

(a)	difference: **M1** (number of) neutrons similarities: **M2** (number of) protons **M3** (number of) electrons	3

8.

(a)	**M1** solid (1) **M2** black (1)	2
(b)(i)	**M1** colourless (1) **M2** to brown / orange / yellow (1)	2
(b)(ii)	$Cl_2 + 2KBr \rightarrow 2KCl + Br_2$ **OR** $Cl_2 + 2Br^- \rightarrow 2Cl^- + Br_2$ **M1** all formulae (1) **M2** equation balanced correctly (1)	2
(c)	**M1** two ticks for Cl_2 / KI, Br_2 / KI (1) **M2** three crosses for Br_2 / KCl, I_2 / KCl and I_2 / KBr (1)	2

9.

(a)	bauxite	1
(b)(i)	improves conductivity / better conductor (1) lower (operating) temperature (1)	2
(b)(ii)	positive: $2O^{2-} \rightarrow O_2 + 4e^-$ (1) negative: $Al^{3+} + 3e^- \rightarrow Al$ (1)	2
(b)(iii)	anodes **or** carbon react with oxygen (1) (form) carbon dioxide (1)	1

10.

one mark for each of any two from: • (chromium / sodium) **conducts** electricity • (chromium / sodium) compounds are **soluble** (in water) • (chromium / sodium) form hydrated salts / form hydrated compounds	2

POINTS

11.

(a)	(hot) air	1
(b)	coke is burned (to form carbon dioxide) **OR** $C + O_2 \rightarrow CO_2$	1
	carbon dioxide is reduced by (more) coke to form **carbon monoxide** or **CO** **OR** $C + CO_2 \rightarrow 2CO$	1
	$3CO + Fe_2O_3 \rightarrow 2Fe + 3CO_2$	1
	limestone (decomposes to) form lime / CaO / calcium oxide (and carbon dioxide) **OR** $CaCO_3 \rightarrow CaO + CO_2$	1
	$CaO + SiO_2 \rightarrow CaSiO_3$	1
(c)	the impurity is C	1
	blow **into** or pass oxygen **through** (molten) **iron**	1
	carbon dioxide escapes or carbon dioxide is a gas	1

12.

)(i)	magnesium is **more** reactive than iron / steel **ORA** (1) iron is not oxidised **OR** iron does not lose electrons **OR** magnesium loses electrons **more easily** than or **in preference** (to iron) **ORA** **OR** magnesium is oxidised **more easily or** reacts with oxygen **more easily or** corrodes **more easily** or **in preference** (to iron) **ORA** (1)	2
ı(ii)	copper is less reactive than iron / copper is lower in the reactivity series than iron **ORA**	1

13.

M1 one shared pair between each H and C M2 three shared pairs of electrons between the C atoms and no other unpaired electrons	2

14.

(a)(i)	covalent	1
(a)(ii)	forces of attraction between molecules **AND** are weak / need a small amount of energy to break	1
(a)(iii)	no **moving** or **flowing** or **mobile charged particles** or **ions** or **electrons**	1

POINTS

15.

(a)(i)	from left to right caesium → rubidium→ potassium →sodium → lithium	**1**
(a)(ii)	caesium hydroxide	**1**
(b)	Group I element is less strong / not strong **ORA** **OR** Group I element has low(er) density **ORA** **OR** Group I element is soft(er) **ORA**	**1**