

- 1 (a) C and F [1]
- (b) A [1]
- (c) B [1]
- (d) D [1]
- (e) E [1]
- (f) A and D [1]

[Total: 6]

- 2 (a) (i) decrease down group; [1]
- (ii) caesium / francium; [1]
- (iii) $2\text{Rb} + 2\text{H}_2\text{O} \rightarrow 2\text{RbOH} + \text{H}_2$ [2]
not balanced = [1]
- (b) (i) Li^+ [1]
- (ii) N^3 [1]
- (iii) regular arrangement of ions / particles / positive and negative ions alternate; [1]
not: atoms
- (iv) 3:1; [1]
ratio to balance charges / reason in terms of valency; [1]

[Total: 9]

- 3 (a) flexible / easily form different shapes / easily moulded / bends (without cracking); [1]
non-biodegradable / unreactive / don't corrode / prevent corrosion / prevent oxidation (of the
conducting metal) / water resistant / waterproof; [1]
- (b) improve appearance / decorative / makes appearance shiny; [1]
prevent corrosion / rusting / protect steel / chromium will not corrode / chromium is not
oxidised / chromium protected by an oxide layer; [1]
- (c) low density / light / protected by oxide layer / no need to paint / resists corrosion / (high
strength / strong;; **any two** [2]
note: high strength to weight ratio = 2
- (d) high mpt / withstands high temperature / good conductor (of heat) / heats up quickly /
malleable / ductile / resists corrosion / good appearance / unreactive (or example of lack of
reactivity e.g. does not react with food or water or acid or air);; **any two** [1]
- (e) (lattice) positive ions / cations / metal ions and sea of electrons / delocalised or free or mobile
or moving electrons; [1]
attraction between positive ions and electrons; [1]

- 4 (a) (i) become darker; [1]
- (ii) increase; [1]
- (iii) black / dark grey; [1]
not: brown
solid; [1]
- (b) (i) same Z / same number of protons; [1]
accept: atoms of the same element
different number of neutrons / different nucleon number / different mass
number; [1]
- (ii) 53 protons and 53 electrons; [1]
- 78 neutrons; [1]
- (iii) xenon; [1]
- (c) $\text{BrF}_3 / \text{F}_3\text{Br}$; [1]
 $\text{BrF}_5 / \text{F}_5\text{Br}$; [1]

[Total: 11]

- 5 (a) 4 Ge atoms around 1 Ge [1]
Looks tetrahedral **or** stated to be [1]
- (b) (i) Graphite has layers [1]
COND that can move/slip [1]
or weak bonds between layers [1]

Graphite has delocalised/free/mobile electrons [1]
- (ii) property and use [1]
soft lubricant **or** pencils
OR good conductor electrodes **or** in electric motors
- (c) CO₂ and SiO₂ **or** XO₂ [1]
- (ii) CO₂ molecular **or** simple molecules **or** simple covalent [1]
SiO₂ macromolecular **or** giant covalent [1]
- (d) Ge₂H₆ [1]

[TOTAL = 10]

- 6 (a) Has to be three different uses.
- any use that depends on malleability **or** ductility-
jewellery, pipes, wires, sheets, roofing, ornaments [1]
NOT that it is malleable **or** ductile
- electrical wires **or** cooking utensils **or** electrodes [1]
(good) conductor
- making alloys **or** named alloy [1]
- (b) (i) $\text{Cu}^{2+} + 2\text{e} = \text{Cu}$ [1]
- (ii) gas is oxygen [1]
(copper(II) sulphate) changes to sulphuric acid [1]
or copper ions removed from solution
- (c)(i) copper atoms - electrons = copper ions [1]
accept correct symbol equation
- (ii) concentration of copper ions does not change **or** [1]
amount **or** number of copper ions does not change
- copper ions are removed and then replaced [1]
or copper is transferred from anode to cathode
- (iii) refining copper **or** plating (core) [1]
or extraction of boulder copper

TOTAL = [10]