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) $2Rb + 2H_2O \rightarrow 2RbOH + H_2$ [2]
not balanced = [1]

(b) (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]
<u>attraction</u> 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) (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) BrF_3 / F_3Br; [1]
BrF_5 / F_5Br; [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
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) CO_2 and SiO_2 **or** XO_2 **[1]**

(ii) CO_2 molecular **or** simple molecules **or** simple covalent **[1]**
SiO_2 macromolecular **or** giant covalent **[1]**

(d) Ge_2H_6 **[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) $Cu^{2+} + 2e = Cu$ **[1]**

(ii) gas is oxygen **[1]**

(copper(II) sulphate) changes to <u>sulphuric acid</u> **[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]