Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

$\Delta\chi = 1.6$, $\bar{\chi} = 2.4$; polar covalent (between ionic and covalent)

2.2

in pure copper the layers of identical cations slide easily; zinc atoms have a different size and disrupt the regular layers; the layers cannot slide as easily, so brass is harder

2.3

–CH_2–$CH(CH_3)$– with the CH_3 on a side branch; with extension bonds at both ends / in brackets with n; addition polymerization

2.4

water; amide link (–CONH–)

3.1

(a) chloroethene (vinyl chloride), CH_2=CHCl

(b) the chains contain only strong C–C and C–H bonds; they are non-polar, so there is nothing for reagents or microorganisms to attack

(c) C–Cl bonds are polar, so there are dipole–dipole forces between chains; these are stronger than the London forces between poly(ethene) chains, so the chains slide less

(d) each –OH reacts with a –COOH (condensation); a water molecule is lost each time; an ester link, –COO–, joins the monomers

3.2

(a) the ability of an atom to attract a shared pair of electrons in a covalent bond

(b) CsF: $\Delta\chi = 3.2$, ionic; $SiCl_4$: $\Delta\chi = 1.3$, $\bar{\chi} = 2.55$, polar covalent; Cu: $\Delta\chi = 0$, $\bar{\chi} = 1.9$, metallic

(c) alloys are harder / stronger; still low density / resist corrosion

(d) any one: low density; can be shaped; unreactive; waterproof; cheap

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