M1. moles NaOH used = vol / 1000 × conc **(1)** = 21.7 *(if uses 25 here only scores first of first 4 marks)*/ 1000 × 0.112 = 0.00243 **(1)** (consider 0.0024 as an arithmetic error loses 1 mark) *(range 0.00242 to 0.00244)*
moles HCl in 25 cm^3 = 0.00243 **(1)** (or 1 mol HCl reacts with 1 mol NaOH)
moles of HCl in 250 cm^3 = 0.0243 **(1)**
moles ZCl_4 = 0.0243 / 4 = 0.006075 **(1)** (or 0.006076 or 0.006 mark is for / 4)
M_r = mass / no. Moles **(1)** (method mark also 1.304 / 0.006075)
= 214.7 **(1)** (or 0.006 gives 217) *(allow 214 to 215)*
A_r = 214.7 - 142 = 72.7 **(1)** (217 gives 75, 142 is 35.5 × 4)
Therefore element is Germanium **(1)** (allow conseq correct from A_r) *(75 gives As)*
If not / 4 C.E. from there on but can score 2 independent marks for (mass / moles / method and identity of element)
(for candidates who use $m_1v_1 = m_2v_2$ and calculate [HCl] = 0.0972 allow 1st 3 marks
if 25 and 21.7 wrong way round only award 1/3)

[9]

M2.A

[1]

M3.D

[1]

M4.B

[1]

M5.B

[1]

M6.A

[1]

M7.B

[1]

M8.C

[1]

M9.C

[1]

M10.B

[1]

M11.D

[1]

M12.C

[1]

M13.D

[1]

M14.C

[1]

M15.B

[1]