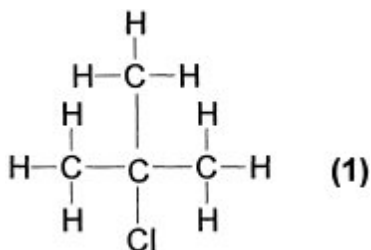


1. (a)



2-chloro-2-methylpropane (1)

No marks for primary or secondary halogenoalkane even if both formula and name are consistent
Must be displayed

2

(b) (i) Hydrogen chloride

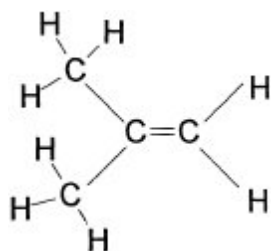
OR HCl

OR (concentrated) hydrochloric acid **NOT dilute** hydrochloric acid
OR sodium / potassium chloride and concentrated sulphuric acid/
phosphoric acid 1

(ii) Substitution (1)

Nucleophilic (1) 2

(c) (i)



2-methylprop-1-ene

2

(ii) No because each carbon atom joined by the double bond has the same two groups attached to it/ OWTTE

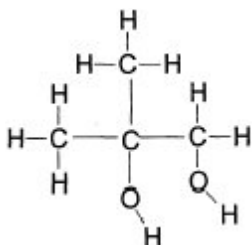
1

(d) Reduction / addition hydrogenation (1)

Oxidation / addition (1)

2

(e)



Must be consistent with (c)(i)
Must be displayed

1

[11]

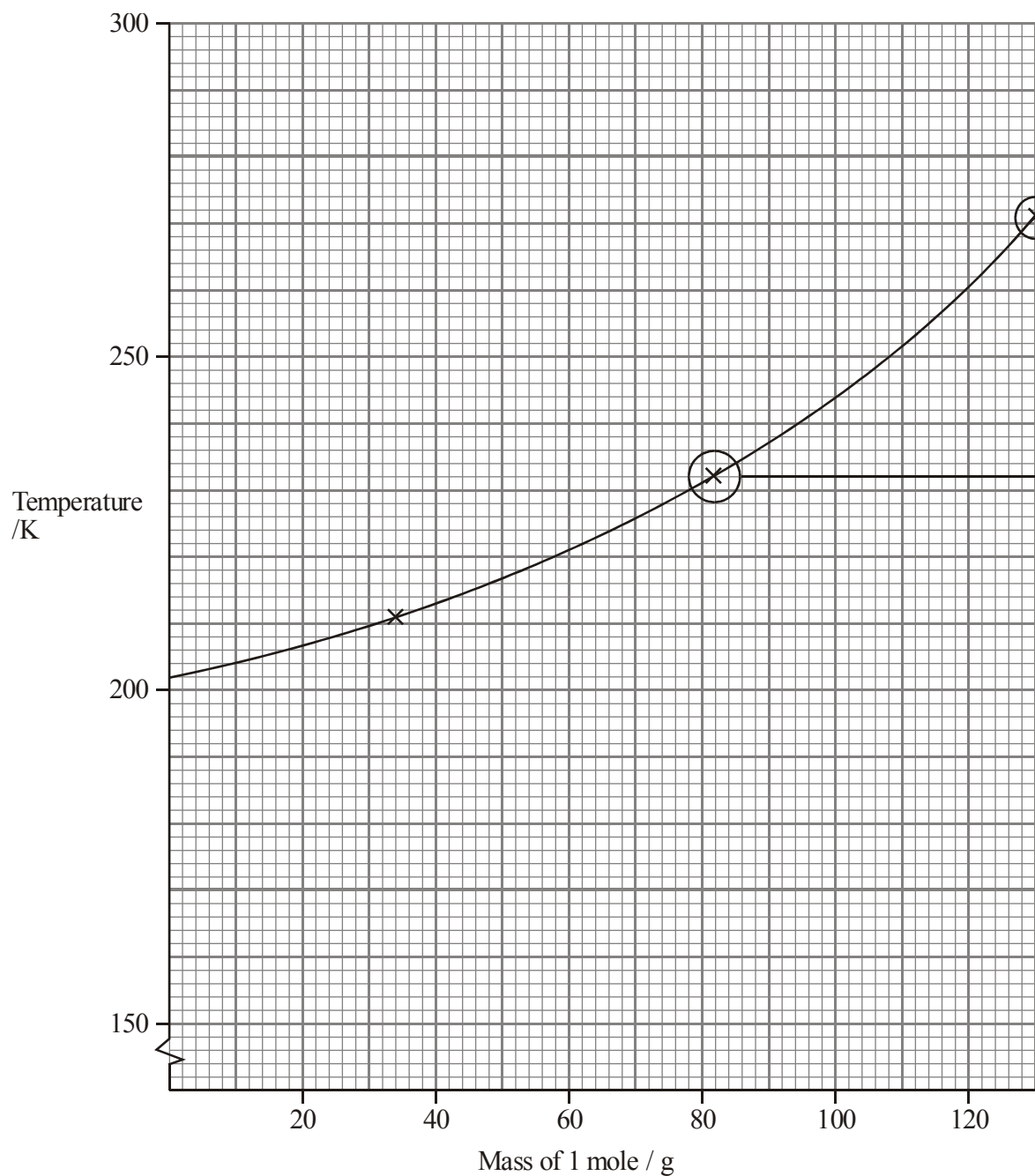
2. (a) (i) a particle / species /group with an unpaired electron /OWTTE 1
- (ii) $\begin{matrix} ++ \\ +\text{Cl}^+ \\ ++ \end{matrix}$ 1
- (iii) homolytic 1
- (b) B and C 1
- (c) (i) $\text{C1}_2 + \text{CH}_4 \rightarrow \text{CH}_3\text{Cl} + \text{HCl}$ 1
- (ii) $+242 + 4 + -339 = -93 \text{ kJ mol}^{-1}$
 (A + B + F)
 OR
 $+4 - 97 = -93 \text{ kJ mol}^{-1}$
 (B + C)
 Method (1)
 answer with units (1) 2
- (d) (i) -242 kJ mol^{-1} 1
- (ii) Exothermic because a bond has been formed. 1
- (e) Less endothermic (1)
 the bond is weaker (1) 2
- [11]
3. (a) (i) It would turn red. 1
- (ii) White fumes 1
- (iii) Sulphur dioxide / SO_2 1
- (b) (i) A pale yellow / off-white / cream precipitate / solid 1
- (ii) The precipitate would dissolve / disappear / the mixture goes clear
 Both AgCl and AgBr are soluble in concentrated ammonia 2
- (c) (i) No more of the solid will dissolve (1)
 at that temperature (1) 2
- (ii) 100 g KBr and 25g KCl (1)
 crystals only KBr (1)
 solution contains both KBr and KCl (1) 3
- [11]

4.

(a) 81 g mol^{-1}

1

(b) (i)



correctly plotted points (1)

smooth curve (1) 2

(ii) As you go down the group the number of electrons increases. (1)
so the strength of the van der Waals forces increase. (1)

2

(c) (i) 204 – 210 K

1

(ii) *Hydrogen/H- bonds*

1

(iii) *Oxygen is more **electronegative** than the others (because the outer electrons are closer to the nucleus)*

1

(iv) ammonia (1)
hydrogen fluoride (1)

2

Marking for key points

One mark should be awarded for every key point clearly identified in an answer, up to a maximum of 6 marks. A tick should be made in the script at which the examiner decided to award each mark eg ³✓. The total marks for key points should be placed in the body of the script at the end of the answer, out of 6. To gain the mark for a key point the wording used by the candidate must make clear the essential chemistry of the point.

- 1 In the **Andrussov** process **ammonia** is reacted / mixed with **methane**) (1)
(or **hydrocarbons**) and **oxygen...** / **oxygenated**)
- 2 and (passed over) a precious *OR* specified metal catalyst ...)
e.g. Pt **and** Rh *OR* Pt **and** Ir) *Any*
four
NOT Pt on its own) (1)
- 3 at a **slightly elevated pressure** and **high temperatures.**) (1)
- 4 In the **Degussa** process a **simpler** / **platinum catalyst** system is) (1)
used **without oxygen**
- 5 To prevent polymerisation stabilisers of strong acids are used (1)
- 6 Hydrogen cyanide is used to make other compounds such as /methyl
methacrylate / Perspex / pharmaceuticals
NOT "speciality chemicals" *on its own* (1)
- 7 Sodium cyanide used to extract **gold and silver from their ores**)
ACCEPT extract gold from gold beating rock) *Any*
one of (1)

Potassium cyanide used in electroplating / dyestuffs)
these

Sodium hexacyanoferrate(II) is used to prevent table salt caking)
three

MAX 6

Quality of Written Communication (2)

These should *be impression* marked on a scale 2–1–0, and the mark out of 2 should be recorded in the body of the script at the end of the answer. This mark can not be lost as a result of a word penalty.

Candidates are expected to:

- show clarity of expression
- construct and present coherent argument
- demonstrate effective use of grammar punctuation and spelling.

The aspects to be considered are:

- use of technical terms; the answer should convey a correct understanding by the writer of the technical terms used in the passage which are involved in the key points
- articulate expression; the answer should be well-organised in clear, concise English, without ambiguity. It should read fluently, with the links between key points in the original maintained.
- legible handwriting; the reader should be able to read the answer without difficulty at normal reading pace, with only the occasional difficulty with a word.
- points must be in a logical order.

Good style and use of English, with only infrequent minor faults **(2)**

Frequent minor or a few major faults in style and use of English **(1)**

Very poor style and use of English **(0)**

[15]