Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Inorganic 1

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Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

Mark Schemes

Q1.

(a) Fractional distillation (under reduced pressure)

1

(b) $BaSO_4$ insoluble / remove by filtration

Do not allow answers which refer to reaction rate

1

(c) Both contain OH group

Allow OH stretch in ir spectrum of each compound

Do not allow 'same bonds'

1

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Q2.

(a) Antacid

OR

to neutralise acidity

OR

eases indigestion

Credit suitable reference to indigestion or to laxative or to relief of constipation

1

(b) **M1** Decrease in T decreases the <u>energy</u> of the <u>particles/ions/H^+/molecules</u>

M2 (also scores M1) Decrease in the number of/less particles/ions/ H^+/molecules with $E \geq E_{Act}$ or E ≥ minimum energy to react

*In **M1** and **M2,** credit "atoms" but ignore "calcium carbonate", ignore "calcium", ignore any ion formula except H^+*

M3 Few(er)/Less effective/productive/successful collisions

QoL

3

(c) (i) Strontium has a higher melting point than barium, because

Correct reference to size of cations/proximity of electrons
M1 (For Sr) delocalised <u>electrons closer to cations/positive ions/atoms/nucleus</u>

OR

cations/positive ions/atoms are smaller

OR

cation/positive ion/atom or it has fewer (electron) shells/levels

Ignore general Group 2 statements

Penalise M1 if Sr or Ba is said to have <u>more or less</u> delocalised electrons

Ignore reference to shielding

***CE = 0** for reference to molecules or intermolecular forces or covalent bonds*

Relative strength of metallic bonding
M2 (Sr) has <u>stronger</u> attraction between the <u>cations/positive ions/ atoms/nucleus</u> and the delocalised <u>electrons</u>

OR

<u>stronger metallic</u> bonding
(assume argument refers to Sr but accept converse argument for Ba) 2

Ignore "Van der Waals forces (between atoms)" but penalise if "between molecules"

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(ii) $Sr + \mathbf{2}H_2O \rightarrow Sr(OH)_2 + H_2$

Or multiples

1

(d) $\mathbf{2}Mg + TiCl_4 \rightarrow \mathbf{2}MgCl_2 + Ti$

Or multiples

1

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Q3.

(a) (i) **M1** The enthalpy change / heat change at constant pressure when <u>1 mol</u> of a compound / substance / product

1

M2 Is formed from its (constituent) <u>elements</u>

1

M3 With all reactants and products / all substances in standard states
OR
All reactants and products / all substances in normal states under standard conditions / 100 kPa / 1 bar and specified T / 298 K

Ignore reference to 1 atmosphere

1

(ii) By definition
OR
Because they are elements

1

(iii) **M1** ΔH_f **=** $\Sigma\Delta H_f$ **(products)** – $\Sigma\Delta H_f$**(reactants)**

1

M2 = –1669 – 3(–558)
(This also scores M1)

1

M3 = **(+) 5** (kJ mol^{-1})

Correct answer gains full marks.
Assume the value is positive unless specifically stated as negative.
Credit 1 mark if – 5 (kJ mol^{-1}).
For other incorrect or incomplete answers, proceed as follows:

- *check for an arithmetic error (AE), which is either a transposition error or an incorrect multiplication; this would score 2 marks (M1 and M2)*
- *If no AE, check for a correct method; this requires either a correct cycle with 3BaO OR a clear statement of M1 which could be in words and scores <u>only M1</u>*

1

(b) (i) *One from*

- <u>Aluminium is expensive</u> (to extract *OR* due to electrolysis)
- <u>High energy cost</u>
- The <u>cost of heating strongly</u>
  This requires a clear statement about <u>cost</u>

1

(ii) *One from*

- <u>increase collision frequency</u>
- OR <u>more collisions</u>

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- OR more chance of colliding

  The answer MUST refer to more collisions.

  Ignore "more available to collide"

1

(c) (i) $Ba + \mathbf{2}H_2O \rightarrow Ba(OH)_2 + H_2$

Ignore state symbols
Allow multiples and correct ionic equations

1

(ii) **M1** $Ba^{2+} + SO_4^{2-} \rightarrow BaSO_4$
(or the ions together)

Allow crossed out Na^+ ions, but penalise if not crossed out

1

M2 White precipitate / white solid

Ignore state symbols
Ignore "milky"

1

(iii) **M1** Barium meal or (internal) X-ray or to block X-rays

1

M2 $BaSO_4$ / barium sulfate is insoluble (and therefore not toxic)

Accept a correct reference to M1 written in the explanation in M2, unless contradictory.

For M2 NOT barium ions
NOT barium
NOT barium meal and NOT "It".

Ignore radio-tracing.

1

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