EXAM PAPERS PRACTICE

Boost your performance and confidence with these topic-based exam questions

Practice questions created by actual examiners and assessment experts

Detailed mark scheme

Suitable for all boards

Designed to test your ability and thoroughly prepare you

Time allowed
44 Minutes

Score /37

Percentage %

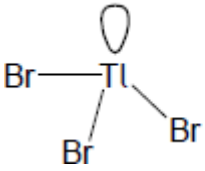
CHEMISTRY

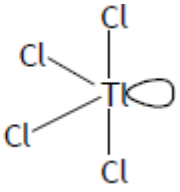
AQA
AS & A LEVEL

Mark Scheme

3.1 Physical chemistry

1 (a)





Mark is for correct number of bonds and lone pair in each case.

Ignore charges if shown.

2

Pyramidal / trigonal pyramid

Allow tetrahedral.

1

107°

Allow 107 to 107.5°.

1

(b) M1 Ionic

CE = 0 / 3 if not ionic.

1

M2 Oppositely charged ions / Tl^+ and Br^- ions

If molecules / intermolecular forces / metallic bonding, CE=0.

1

M3 Strong attraction between ions

M3 dependent on M2.

Allow 'needs a lot of energy to break / overcome' instead of 'strong'.

1

(c) $Tl + \frac{1}{2}Br_2 \longrightarrow TlBr$

Allow multiples.

Ignore state symbols even if incorrect.

1

[8]

2 (a) Giant covalent / giant molecular / macromolecular *Not giant alone.*

Not covalent alone.

1

(b) Shared pair of electrons / one electron from each C atom

1

(c) No delocalised / free / mobile electrons

Allow all (outer) electrons involved in (covalent) bonds.

Ignore ions.

1

(d) CH

Allow HC

C and H must be capital letters.

1

[4]

3 (a) (i) d (block) **OR** D (block)

Ignore transition metals / series.

Do not allow any numbers in the answer.

1

(ii) Contains positive (metal) ions or protons or nuclei and <u>delocalised / mobile / free / sea of</u> electrons

Ignore atoms.

1

<u>Strong attraction</u> between them or <u>strong metallic</u> bonds

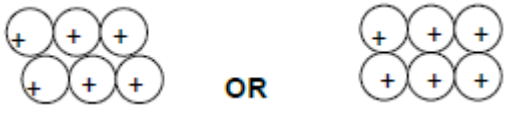
Allow 'needs a lot of energy to break / overcome' instead of 'strong'.

If strong attraction between incorrect particles, then CE = 0 / 2.

If molecules / intermolecular forces / covalent bonding / ionic bonding mentioned then CE=0.

1

(iii)



OR

M1 is for regular arrangement of atoms / ions (min 6 metal particles).

M2 for + sign in each metal atom / ion.

Allow 2^+ sign.

2

(iv) <u>Layers / planes / sheets of atoms or ions</u> can slide over one another

QoL.

1

(b) (i) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^8\ (4s^0)$

Only.

1

(ii) $NiCl_2.6H_2O + \mathbf{6}\ SOCl_2 \longrightarrow NiCl_2 + \mathbf{6}\ SO_2 + \mathbf{12}\ HCl$

Allow multiples.

1

$NaOH / NH_3 / CaCO_3 / CaO$

Allow any name or formula of alkali or base.

Allow water.

1

[9]

4 (a) 2-bromo-2,3-dimethylbutane

Ignore punctuation.

1

$C_nH_{2n+1}Br$ or $C_nH_{2n+1}X$ or $C_xH_{2x+1}Br$

Any order.

1

Stronger / more <u>vdw</u> (forces) <u>between molecules</u> (of 1-bromohexane)

QoL

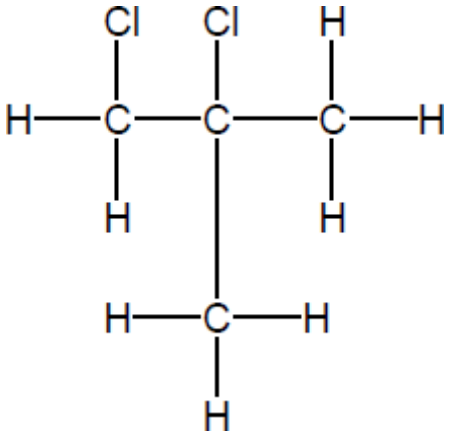
Allow converse arguments for Z

Not just more IMF.

Ignore size of molecule.

1

(b)



1

C_2H_4Cl

Any order

1

[5]

5 .(a) M1 $550 \times \frac{100}{95}$ = 579 g would be 100% mass

Allow alternative methods.

There are 4 process marks:

1

M2 So $\frac{579}{65}$ = 8.91 moles NaN_3

or

M1 $\frac{550}{65}$ = 8.46 moles NaN_3 (this is 95%)

M2 So 100% would be $8.46 \times \frac{100}{95}$ = 8.91 moles NaN_3

1: mass ÷ 65

2: mass or moles × 100 / 95 or × 1.05

3: moles NaN_3 × 2

4: moles $NaNH_2$ × 39

1

Then M3 Moles $NaNH_2$ = 8.91 × 2 = (17.8(2) moles)

1

M4 mass $NaNH_2$ = 17.8(2) × 39

1

M5 693 or 694 or 695 (g)

If 693, 694 or 695 seen to 3 sig figs award 5 marks

1

(b) M1 308 K and 150 000 Pa

1

M2 $n = \frac{PV}{RT}$ or $\frac{150\,000 \times 7.5 \times 10^{-2}}{8.31 \times 308}$

1

M3 = 4.4(0) or 4.395 moles N_2

Allow only this answer but allow to more than 3 sig figs

1

M4 Moles NaN_3 = 4.395 × $\frac{2}{3}$ (= 2.93)

M4 is for M3 × $\frac{2}{3}$

1

M5 Mass NaN_3 = (2.93) × 65

M5 is for moles M4 × 65

1

M6 = 191 g

Allow 190 to 191 g allow answers to 2 sig figs or more

1

(c) (i) 150 / 65 = 2.31 moles NaN_3 or 2.31 moles nitrous acid

1

Conc = 2.31 × $\frac{1000}{500}$

M2 is for M1 × 1000 / 500

1

4.6(1) or 4.6(2) (mol dm^{-3})

Only this answer

1

(ii) $3HNO_2 \longrightarrow HNO_3 + 2NO + H_2O$

Can allow multiples

1

(d) Ionic

If not ionic then CE = 0 / 3

1

Oppositely charged ions / Na^+ and N_3^- ions

Penalise incorrect ions here but can allow M3

1

Strong attraction between (oppositely charged) ions / lots of energy needed to overcome (strong) attractions (between ions)

M3 dependent on M2

1

(e) (i) $N \equiv N \longrightarrow N^-$

Only

1

(ii) CO_2 / N_2O / BeF_2 / HN_3

Allow other correct molecules

1

(iii) MgN_6

Only

1

[21]

6 (a) Macromolecular / giant covalent / giant molecule *Not giant atomic*

1

(b) No delocalised electrons / no free ions / no free charged particles

1

(c) $SiO_2 + 6HF \longrightarrow H_2SiF_6 + 2H_2O$

Accept multiples

1

[3]