

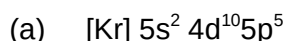
Name of the Student: _____

Max. Marks : 24 Marks

Time : 24 Minutes

Mark Schemes

Q1.



1

- (b) This question is marked using levels of response. Refer to the Mark Scheme Instructions for Examiners for guidance on how to mark this question.

Level 3

All stages are covered and the explanation of each stage is correct and complete.

Answer communicates the whole explanation coherently and shows a logical progression from stage 1 to stage 2 and then stage 3.

5-6 marks

Level 2

All stages are covered but the explanation of each stage may be incomplete or may contain inaccuracies **OR** two stages are covered and the explanations are generally correct and virtually complete.

Answer is mainly coherent and shows a progression through the stages. Some steps in each stage may be out of order and incomplete.

3-4 marks

Level 1

Two stages are covered but the explanation of each stage may be incomplete or may contain inaccuracies, **OR** only one stage is covered but the explanation is generally correct and virtually complete.

Answer includes some isolated statements, but these are not presented in a logical order or show confused reasoning.

1-2 marks

Level 0

Insufficient correct chemistry to warrant a mark.

0 marks

Indicative Chemistry content

Stage 1

I₂ is molecular.

HI is molecular.

Stage 2

IMF hold the molecules together.

There are weak IMF forces hence the melting point is low in both substances.

I₂ bigger molecule than HI so I₂ has more electrons.

Stage 3

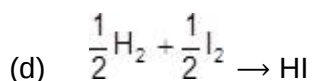
Therefore stronger van der Waals between molecules in I_2 that need more energy to break causing the melting point to be higher.

HI also shows permanent dipole-dipole attraction between molecules but these forces are less than the vdW forces in iodine.

6

- (c) No delocalised electrons or ions

1

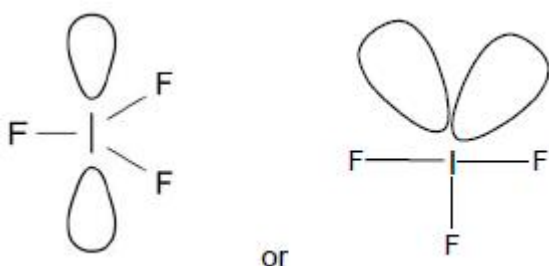


Allow multiples

1

- (e) NH_4I_3

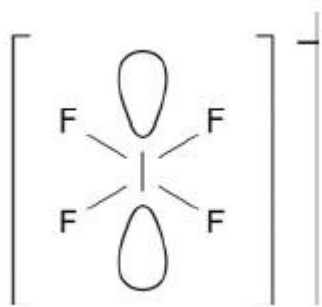
1



- (f)

Allow any shape with 3 bond pairs and 2 lone pairs

1



Allow any shape with 4 bond pairs and 2 lone pairs (e.g. lone pairs in equatorial positions)

1

- (g) +5

1

+7

1

[14]

Q2.

- (a) This question is marked using levels of response. Refer to the Mark Scheme Instructions for Examiners for guidance on how to mark this question.

All stages are covered and the explanation of each stage is generally correct and virtually complete.

Answer is communicated coherently and shows a logical progression from stage 1 to stage 2 then stage 3.

Level 3
5 – 6 marks

All stages are covered but the explanation of each stage may be incomplete or may contain inaccuracies OR two stages are covered and the explanations are generally correct and virtually complete.

Answer is mainly coherent and shows progression from stage 1 to stage 3.

Level 2
3 – 4 marks

Two stages are covered but the explanation of each stage may be incomplete or may contain inaccuracies, OR only one stage is covered but the explanation is generally correct and virtually complete

Answer includes isolated statements but these are not presented in a logical order or show confused reasoning.

Level 1
1 – 2 marks

Insufficient correct chemistry to gain a mark.

Level 0
0 marks

Indicative chemistry content

Stage 1: Electrons round P

- P has 5 electrons in the outside shell
- With 3 electrons from 3 fluorine, there are a total of 8 electrons in outside shell
- so 3 bond pairs, 1 non-bond pair

Stage 2: Electron pair repulsion theory

- Electron pairs repel as far as possible
- Lone pair repels more than bonding pairs

Stage 3: Conclusions

- Therefore, tetrahedral / trigonal pyramidal shape
- With angle of $109(.5)^{\circ}$ decreased to 107°

6

- (b) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7$

Allow correct numbers that are not superscripted

1

- (c) Too many electrons in d sub-shell / orbitals

1

- (d) Tetrahedral (shape)

1

109.5°

Allow 109°

1

[10]