InkChemistry

QUESTION WORKBOOK

Shapes of molecules and ions

Bonding and structure · Unit C03

AQA 3.1.3.5 · OCR A 2.2.2

20 questions · 61 marks

PRINT EDITION

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SECTION A · Short, 1 to 2 marks

A1 SM-Q1 State the principle of electron-pair repulsion theory. [2]

A2 SM-Q4 Give the shape of the oxonium ion, H_3O^+, and its bond angle. [2]

A3 SM-Q13 Suggest the shape of a molecule of sulfur dichloride, SCl_2, and estimate its bond angle. [2]

A4 SM-Q21 Suggest the shape of the nitrate ion, NO_3^-, and its bond angle, given that it is isoelectronic with BF_3. [2]

A5 SM-Q2 State the order of strength of the three kinds of repulsion between electron pairs. [1]

SECTION B · Standard, 3 to 5 marks

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B1 SM-Q5 Explain the shape of an ammonia molecule and why its bond angle is 107°. [4]

B2 SM-Q7 Explain the shape of a PCl_5 molecule, giving its bond angles. [4]

B3 SM-Q14 Compare the shapes of CO_2 and SO_2, explaining the difference. [4]

B4 SM-Q17 Outline how the number of electron pairs round the iodine atom in the ion IF_4^+ is found, and use it to deduce the shape of the ion. [4]

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B5 [3]
SM-Q6

Explain why the H–N–H bond angle in NH_4^+ is larger than in NH_3.

B6 [3]
SM-Q8

Explain why XeF_4 is square planar.

B7 [3]
SM-Q9

Explain why the ClF_3 molecule is T-shaped, with F–Cl–F angles a little under 90°.

B8 [3]
SM-Q10

Describe how a methane molecule is drawn to show its three-dimensional shape.

B9 [3]
SM-Q11

Suggest the shape of a BrF_5 molecule and estimate its bond angle.

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B10 [3]
SM-Q12

Suggest the shape of the triiodide ion, I_3^-, and give its bond angle.

B11 [3]
SM-Q15

Evaluate a student's prediction that XeF_2 is bent, like water, because both have two bonded atoms and lone pairs on the central atom.

B12 [3]
SM-Q18

Suggest the shape of the amide ion, NH_2^-, and estimate its bond angle.

B13 [3]
SM-Q19

Explain how the shape round the boron atom changes when ammonia and boron trifluoride join to form $H_3N{\rightarrow}BF_3$.

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B14 Explain why benzene, C_6H_6, is a planar molecule with bond angles of 120°. [3]
SM-Q20

SECTION C · Long, 6 marks or more

C1 Explain how electron-pair repulsion theory accounts for the bond angles in CH_4, NH_3 and H_2O. [6]
SM-Q16

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