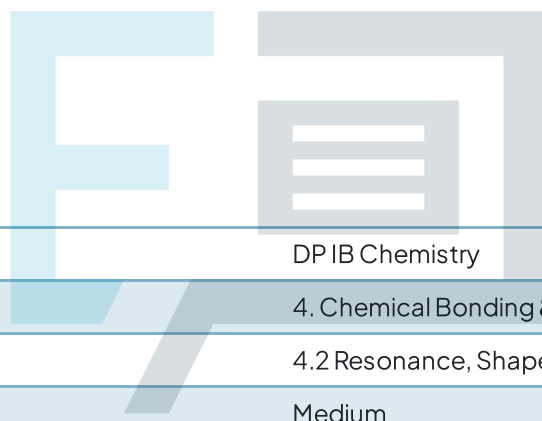




4.2 Resonance, Shapes & Giant Structures

Question Paper



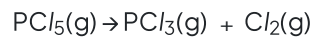
| | |
|------------|--|
| Course | DP IB Chemistry |
| Section | 4. Chemical Bonding & Structure |
| Topic | 4.2 Resonance, Shapes & Giant Structures |
| Difficulty | Medium |

Exam Papers Practice

To be used by all students preparing for DP IB Chemistry SL
Students of other boards may also find this useful

Question 1

The following equation shows the dissociation equilibrium of PCl_5 .



The percentage yield of PCl_3 varies with temperature.

At 160°C PCl_3 yield is 13% and at 300°C yield is 100%.

Which of the following rows is correct?

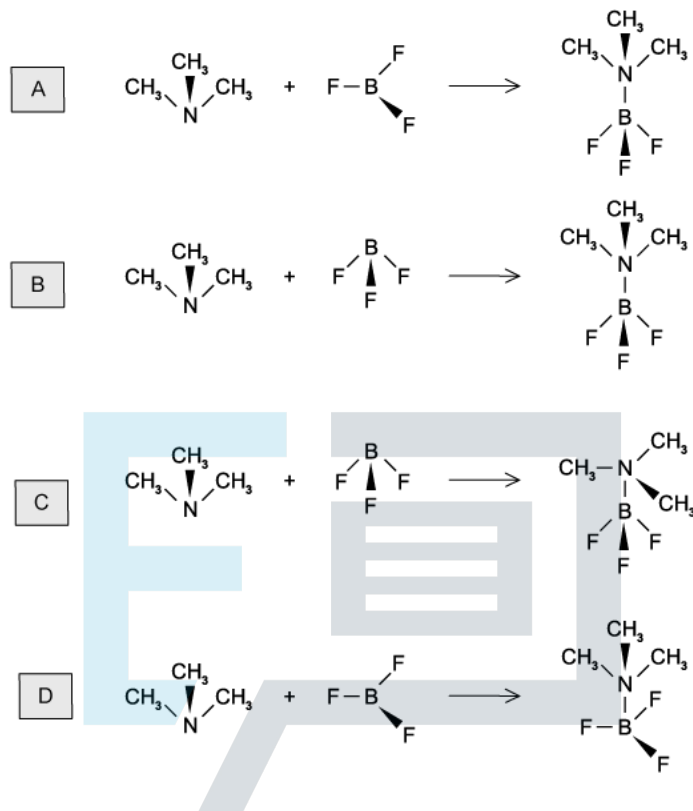
| | The reaction is | Shape of PCl_3 molecule |
|---|-----------------|---------------------------|
| A | exothermic | trigonal pyramidal |
| B | exothermic | trigonal planar |
| C | endothermic | trigonal pyramidal |
| D | endothermic | trigonal planar |

[1 mark]

Question 2

Boron trifluoride, BF_3 , reacts with trimethylamine, $(\text{CH}_3)_3\text{N}$, to form a compound of formula $(\text{CH}_3)_3\text{N}.\text{BF}_3$.

How may this reaction be written using 3D structures to show the shapes of the reactants and products?



- A.
B.
C.
D.

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[1 mark]

Question 3

Which of the following statements about graphite are correct?

- I. The carbon atoms are joined together by three covalent bonds
- II. Graphite contains delocalised electrons
- III. The C-C-C bond angle is 109.5°

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

[1 mark]

Question 4

Which statement below shows the correct information about diamond and silicon?

- A. Diamond is macromolecular and silicon is simple molecular
- B. The bond angles in the two structures are the same
- C. The bond lengths are longer in C-C than in Si-Si
- D. Diamond and silicon both conduct electricity due to delocalised electrons in their structure

[1 mark]

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Question 5

How many lone pairs of electrons are there around the chlorine atom in a molecule of chlorine trifluoride, ClF_3 ?

- A. 1
- B. 2
- C. 3
- D. 0

[1 mark]

Question 6

Which one of these species has a bond angle of 120° ?

- A. H_3O^+
- B. TlBr_3^{2-}
- C. BCl_3
- D. NH_3

[1 mark]

Question 7

Which of the following statements about silicon dioxide is correct?

- I. Silicon dioxide forms a giant covalent network
- II. Each silicon atom is covalently bonded to four oxygen atoms
- III. Silicon dioxide molecules are V-shaped

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

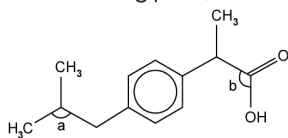
[1 mark]



Exam Papers Practice

Question 8

Ibuprofen is an anti-inflammatory drug that is used for treating pain, fever and inflammation. The structure is shown below.



Ibuprofen

What are the correct bond angles for *a* and *b*?

| | <i>a</i> | <i>b</i> |
|----------|----------|----------|
| A | 120° | 120° |
| B | 107° | 109.5° |
| C | 109.5° | 120° |
| D | 120° | 109.5° |

[1 mark]

Question 9

Which of the following molecules obeys the octet rule?

- A. BF₃
- B. HCN
- C. BeCl₂
- D. CS₂

[1 mark]

Question 10

Which row in the table is correct?

| | Shape of diamond structure | Melting point of buckminsterfullerene | Bond angle in graphene |
|----------|----------------------------|---------------------------------------|------------------------|
| A | Square planar | Relatively high | 90° |
| B | Tetrahedral | Relatively low | 107° |
| C | Trigonal Planar | Relatively high | 109.5° |
| D | Tetrahedral | Relatively low | 120° |

[1 mark]



Exam Papers Practice