

4.2 Resonance, Shapes & Giant Structures

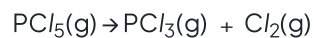
Question Paper

Course	DPIB Chemistry
Section	4. Chemical Bonding & Structure
Topic	4.2 Resonance, Shapes & Giant Structures
Difficulty	Medium

Time allowed: 20
Score: /10
Percentage: /100

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?

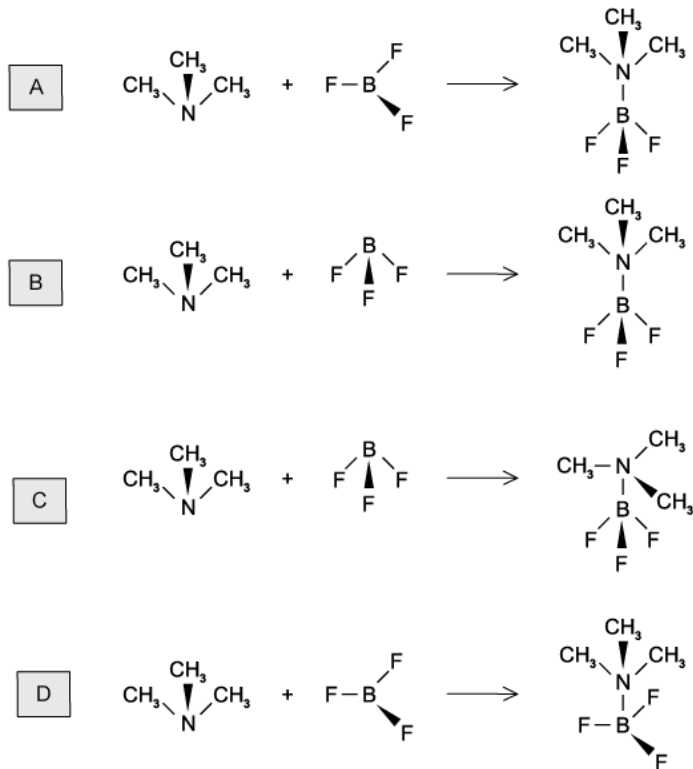
	The reaction is	Shape of PCl_3 molecule
A	exothermic	trigonal pyramidal
B	exothermic	trigonal planar
C	endothermic	trigonal pyramidal
D	endothermic	trigonal planar

[1 mark]

Question 2

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

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



- A.
- B.
- C.
- D.

[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]

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?

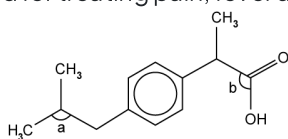
- I. Silicon dioxide forms a giant covalent network
- II. Each silicon atom is covalently bonded to four oxygen atoms
- III. Silicon dioxide molecules are V-shaped

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

[1 mark]

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. BF_3
- B. HCN
- C. BeCl_2
- D. CS_2

[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]