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	Hard

Time allowed: 20

Score: /10

Percentage: /100

Question 1

Which of the species shown below does **not** have resonance structures?

A. C_6H_6

B. CO_3^{2-}

C. C_2H_4

D. O_3

[1 mark]

Question 2

The correct molecular geometry and domain geometry for phosphorus trichloride, PCl_3, is:

	molecular geometry	domain geometry
A	trigonal planar	trigonal planar
B	trigonal pyramid	tetrahedral
C	tetrahedral	trigonal planar
D	tetrahedral	trigonal pyramid

[1 mark]

Question 3

Below are statements about the structure and bonding in silicon dioxide. Which pair of statements is correct?

	structure	bonding
A	silicon dioxide molecules are bent linear	silicon atoms have covalent bonds to two oxygen atoms
B	silicon dioxide has a giant macromolecular structure	each oxygen bonds covalently to one silicon atom
C	silicon dioxide has a giant macromolecular structure	silicon atoms bond to four oxygen atoms
D	silicon dioxide molecules are linear	silicon and oxygen atoms are joined by a double covalent bond

[1 mark]

Question 4

Which compounds have an ionic lattice structure in the solid state?

I. silicon dioxide
II. sodium iodide
III. ammonium sulfate

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

[1 mark]

Question 5

What is the correct shape of a ClF_2^- ion?

A. Linear

B. T-Shaped

C. Bent

D. Trigonal planar

[1 mark]

Question 6

The correct shape and bond angle for the $TlBr_3^{2-}$ ion?

	Shape	Bond angle
A	Pyramidal	120°
B	Pyramidal	107°
C	Tetrahedral	109.5°
D	Tetrahedral	120°

[1 mark]

Question 7

Which of the following is correct for the molecules of $BeCl_2$ and $BeCl_4^{2-}$?

	$BeCl_2$		$BeCl_4^{2-}$	
	Shape	Bond angle	Shape	Bond angle
A	Linear	109.5°	Square planar	90°
B	V-shaped	107°	Square planar	90°
C	V-shaped	105°	Tetrahedral	109.5°
D	Linear	180°	Tetrahedral	109.5°

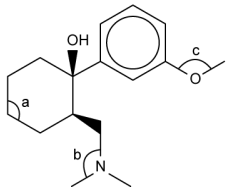
[1 mark]

Question 8

Tramadol is an example of a painkiller which is classed as an opioid analgesic. It binds to opioid receptors in the central nervous system and inhibits noradrenaline and serotonin reuptake inhibiting pain transmission

The structure is shown below

Which of the following are the correct bond angles for *a*, *b* and *c*?



	a	*b*	*c*
A	120°	109.5°	107°
B	120°	107°	105°
C	107°	109.5°	107°
D	109.5°	107°	105°

[1 mark]

Question 9

Some properties of substance X are given in the following table

Melting Point	Very high
Strength	Very strong across the layer
Conductivity	Excellent conductor
Example of a Use	Used as a coating for smartphones, tablets and computers

What is a possible identity of substance X?

A. Graphene

B. Graphite

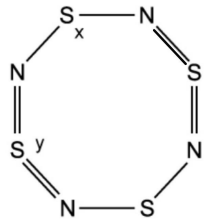
C. Silicon dioxide

D. Buckminsterfullerene

[1 mark]

Question 10

Sulfur forms the compound S_4N_4 with nitrogen, the structure is shown below.



Which of the following statements about S_4N_4 is correct?

A. The sulfur atom marked x has two lone pairs

B. The sulfur atom marked y has two lone pairs

C. Each N atom has two lone pairs

D. The N-S-N bond angle will be larger than S=N=S bond angle

[1 mark]