

# 14.1 More Structures & Shapes

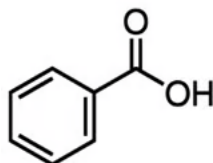
## Question Paper

Course	DP IB Chemistry
Section	14. Chemical Bonding & Structure (HL only)
Topic	14.1 More Structures & Shapes
Difficulty	Hard

**Time allowed:** 10  
**Score:** /5  
**Percentage:** /100

### Question 1

The structure of benzoic acid is shown below:



What is the correct number of sigma ( $\sigma$ ) bonds and pi ( $\pi$ ) electrons in benzoic acid?

	Number of sigma bonds	Number of pi electrons
A.	10	6
B.	15	8
C.	17	4
D.	9	10

[1 mark]

### Question 2

Which of the following correctly describes the F-S-F bond angles in sulfur tetrafluoride, SF<sub>4</sub>?

	Axial F-S-F bond angle / °	Equatorial F-S-F bond angle / °
A.	90	120
B.	<90	>120
C.	<90	<120
D.	>90	<120

[1 mark]

### Question 3

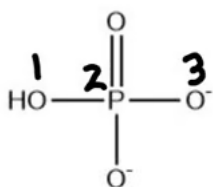
Which of the following species is polar?

- A. ICl<sub>4</sub><sup>-</sup>
- B. PF<sub>5</sub>
- C. SO<sub>3</sub>
- D. SH<sub>2</sub>

[1 mark]

### Question 4

What are the formal charges on the atoms labelled 1, 2 and 3 on the hydrogen phosphate ion,  $\text{HPO}_4^{2-}$ ?

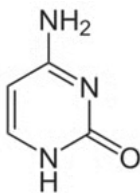


	Formal charge on atom 1	Formal charge on atom 2	Formal charge on atom 3
A.	0	0	-1
B.	0	+1	-1
C.	-1	0	-1
D.	+1	-2	0

[1 mark]

### Question 5

The structure of the DNA base cytosine is shown below:



What is the correct number of  $sp^3$  and  $sp^2$  orbitals in a cytosine molecule?

	Number of $sp^3$ orbitals	Number of $sp^2$ orbitals
A.	2	6
B.	12	12
C.	9	15
D.	8	18

[1 mark]