

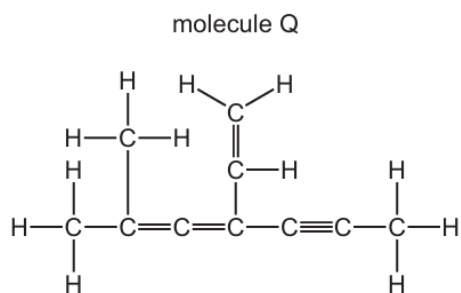
13. An introduction to AS Level organic chemistry

13.3 Shapes of organic molecules; σ and π bonds

Paper 1

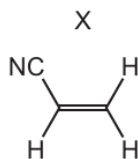
Question Paper

- 1 The diagram shows the structural formula of a hydrocarbon molecule Q.



How many of the carbon atoms in molecule Q are sp^2 hybridised?

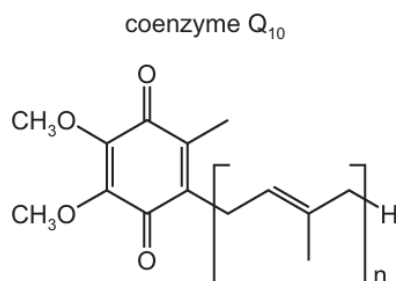
- A** 3 **B** 4 **C** 7 **D** 10
- 2 The diagram shows the structure of X.



Which row is correct?

	number of σ bonds in X	type of hybridisation of the carbon atoms in X
A	4	sp and sp^2
B	4	sp^2 and sp^3
C	6	sp and sp^2
D	6	sp^2 and sp^3

- 3 The diagram shows a simplified structure of coenzyme Q₁₀.

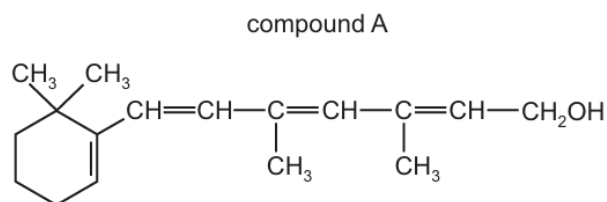


Which row describes the structure of coenzyme Q₁₀ correctly?

	the coenzyme is	number of π bonds in one molecule
A	an aldehyde	$n + 2$
B	an aldehyde	$n + 4$
C	a ketone	$n + 2$
D	a ketone	$n + 4$

- 4 How many σ and π bonds are in the molecule $\text{HCCCH}_2\text{CH}_2\text{CHC}(\text{CH}_3)_2$?
- A** $17\sigma\ 3\pi$ **B** $17\sigma\ 5\pi$ **C** $18\sigma\ 4\pi$ **D** $19\sigma\ 3\pi$
- 5 Which feature is present in both ethene and poly(ethene)?
- A** bond angles of 109.5°
B π covalent bonds
C σ covalent bonds
D sp^3 orbitals
- 6 How many σ bonds are present in one $\text{H-C}\equiv\text{C-C}(\text{CH}_3)=\text{CH}(\text{CH}_3)$ molecule?
- A** 5 **B** 11 **C** 13 **D** 16

- 7 The structure of compound A is shown.



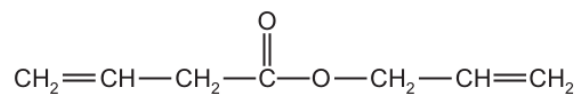
Some of the carbon atoms in compound A have a tetrahedral arrangement of bonds.

Some of the carbon atoms in compound A have a trigonal planar arrangement of bonds.

How many carbon atoms are there of each type?

	tetrahedral	trigonal planar
A	5	12
B	8	8
C	9	6
D	9	8

- 8 The diagram shows a molecule that has σ bonds and π bonds.



How many σ bonds are present in this molecule?

- A** 15 **B** 17 **C** 18 **D** 21