Bond and structure test

Chemistry IB11

Name:
Date:

1. Describe ionic bond [4]

2. Describe the properties of ionic compounds. For three of these properties, explain why they are the product of the nature of ionic bond. [4]

3. Describe covalent bond. [3]
Note: in order to avoid repetition, read question 4 before answering.

4. Explain dipole-dipole interactions based on the description made in question 3. [4]

5. Describe metallic bond enough to explain that a) copper has a high melting point but it doesn't break like ionic compounds do [3] and b) copper has a high electric conductivity [2].
Additional details about the metallic bond will be considered bonus (up to 3 points)

6. Draw the Lewis structures of the following [2 each]

a) H_2O

b) HCN

c) PCl_3

d) NO_3^-

e) SO_2

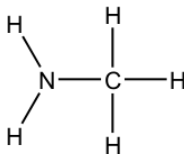
f) PH_3

g) N_2O (HL)

h) N_3^- (HL)

i) urea ($NH_2 – CO– NH_2$)

7. This compound is called methylamine.



a) Complete the Lewis structure. [1]

b) Use VSEPR to estimate the H – N – H angle. Explain how you did it. [3]

8. Describe the geometry, the shape and, if possible, estimate the bond angles in one of these compounds. (HL)
a) SF_4 [4]
b) PF_5 [4]

c) Comparing the molecular weight of this compound with that of propane ($CH_3 – CH_2 – CH_3$), methylamine has lower molecular weight than propane, which is a gas and doesn't condensate until -42ºC. Methylamine however has a boiling point of -6 ºC. Explain why. [4]

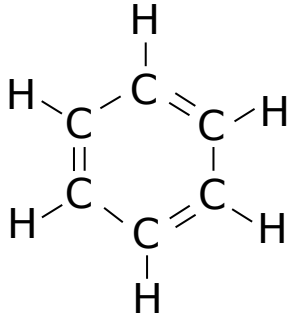
9 Explain why London dispersion forces are stronger in larger atoms. [3]

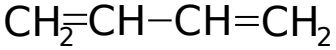
10. Explain what happens to a salt when it's dissolved in water. [3]

11. State what chlorofluorocarbons are and why they are so dangerous for the environment. [4]

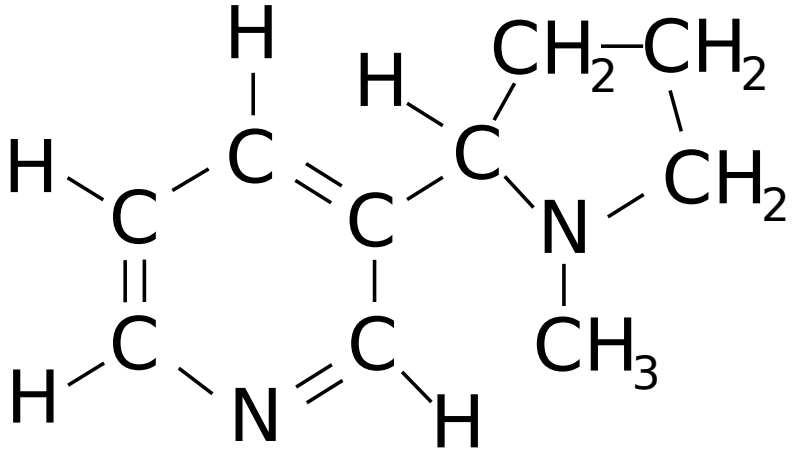
12. Describe what a pi bond is using as a model the molecule of ethene ($CH_2 = CH_2$) [4] (HL)

13. Describe the delocalised pi system in one of these two compounds. Don't forget to mention how many atoms and electrons are involved and how it affects the geometry of the molecule. [4] (HL)





14. Complete the Lewis structure and state the hybridisation of all atoms in the molecule of nicotine. [3] (HL)



15. Bonus: in the compound indole the nitrogen atom has sp^2 hybridization. Explain why. [3] (HL)