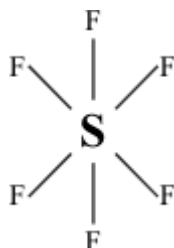


**Molecules**

1. Sulphur hexafluoride is a colourless, odourless, non-flammable gas, which is insoluble in water and extremely unreactive. It is used as an insulator in high voltage transformers and switchgear.

The diagram below represents a molecule of sulphur hexafluoride.



- (a) What type of chemical bond holds the sulphur and fluorine atoms together in sulphur hexafluoride molecules?

..... (1)

- (b) Explain why sulphur hexafluoride has a low boiling point.

.....  
 ..... (2)

- (c) Explain how **three** of the properties of sulphur hexafluoride make it suitable for use as an insulator inside electrical transformers.

Property 1: .....

Explanation: .....

.....

Property 2: .....

Explanation: .....

.....

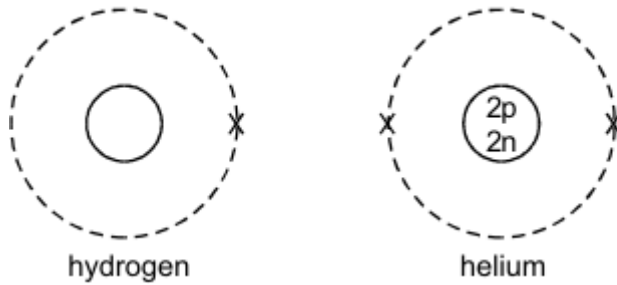
Property 3: .....

Explanation: .....

.....

(3)  
 (Total 6 marks)

2. (a) The diagrams represent the atomic structures of two gases, hydrogen and helium.



x = an electron  
p = a proton  
n = a neutron

Hydrogen gas is made up of diatomic molecules (molecules with two atoms).  
Helium gas exists as single atoms.

- (i) How is a molecule of hydrogen formed from two hydrogen atoms?  
(You may use a diagram as part of your answer)

.....  
.....

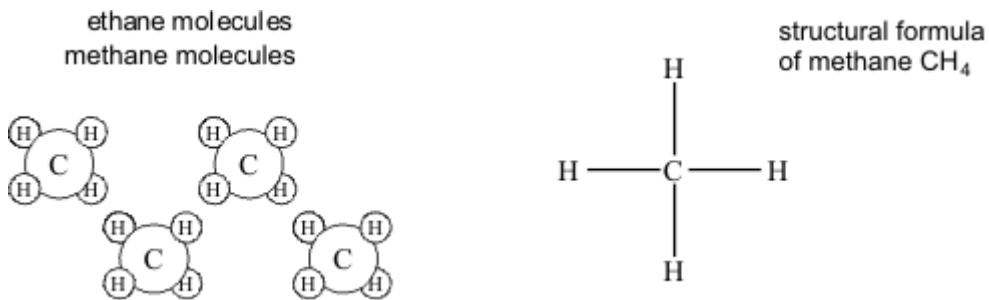
(2)

- (ii) Why does helium exist only as single atoms?

.....  
.....  
.....

(2)

- (b) Hydrogen combines with carbon to form methane.  
Each molecule contains four hydrogen atoms strongly bonded to a carbon atom.



Explain why methane has a low boiling point.

.....  
.....  
.....

(2)  
(Total 6 marks)