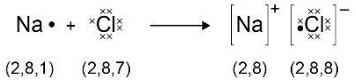
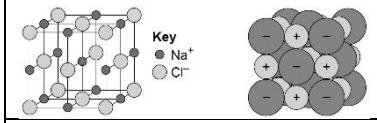
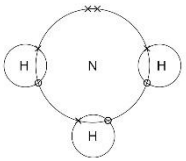
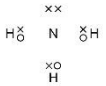
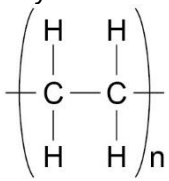
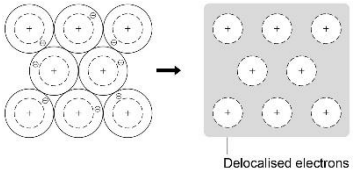
BONDING

Content	Page number			Exam paper
	C FT	C HT	Sep	
There are three types of strong chemical bonds: ionic, covalent and metallic. For ionic bonding the particles are oppositely charged ions. For covalent bonding the particles are atoms which share pairs of electrons. For metallic bonding the particles are atoms which share delocalised electrons. Ionic bonding occurs in compounds formed from metals combined with non-metals. Covalent bonding occurs in non-metallic elements and in compounds of non-metals. Metallic bonding occurs in metallic elements and alloys.	113-117	112-115	28-33	1
When a metal atom reacts with a non-metal atom, electrons in the outer shell of the metal atom are transferred. Metal atoms lose electrons to become positively charged ions. Non-metal atoms gain electrons to become negatively charged ions. The ions produced by metals in Groups 1 and 2 and by non-metals in Groups 6 and 7 have the electronic structure of a noble gas (Group 0). The electron transfer during the formation of an ionic compound can be represented by a dot and cross diagram, eg for sodium chloride:  (2,8,1) (2,8,7) (2,8) (2,8,8) The charge on the ions produced by metals in Groups 1 and 2 and by non-metals in Groups 6 and 7 relates to the group number of the element in the periodic table.	113-115	112-114	28-30	1
An ionic compound is a giant structure of ions. Ionic compounds are held together by strong electrostatic forces of attraction between oppositely charged ions. These forces act in all directions in the lattice and this is called ionic bonding. The structure of sodium chloride can be represented in the following forms: 	115	114	30	1
When atoms share pairs of electrons, they form covalent bonds. These bonds between atoms are strong. Covalently bonded substances may consist of small molecules. Some covalently bonded substances have very large molecules, such as polymers.	116-118	115-117	31-33	1

Some covalently bonded substances have giant covalent structures, such as diamond and silicon dioxide. The covalent bonds in molecules and giant structures can be represented in the following forms: For ammonia (NH_3)  and/or  and/or  and/or  Polymers can be represented in the form:  poly(ethene) where n is a large number.				
Metals consist of giant structures of atoms arranged in a regular pattern. The electrons in the outer shell of metal atoms are delocalised and so are free to move through the whole structure. The sharing of delocalised electrons gives rise to strong metallic bonds. The bonding in metals may be represented in the following form:  	120	119	35	1