Chemistry 12 2009 Name
Bonding

Answer these questions in the spaces provided.

1. This question asks you to predict the properties of elements from their positions in the Periodic Table. The symbols for ten elements are shown. Answer the questions about these elements.

Li																	Ne
																Cl	
				V							Zn		Ge			Br	
																I	
	Sr																
Cs																	

a) Write the symbol of the element with the highest electronegativity. _____

b) Write the formula for a covalent molecular compound that could be formed by combining two of the elements _____

c) Write the symbol for the element with the lowest first ionisation energy. _____

d) Write the formula for the carbonate of Cs _____

e) Write the symbol for the element that exists as a covalent molecular solid at room temperature _____

(5 marks)

2. Place the following substances in the appropriate column based on the most significant type of intermolecular force present. (4 marks)

C_2H_5OH, CH_3Cl, H_2O, CH_2F_2, BH_3, NI_3, CS_2, HF

Hydrogen bonding	**Dipole-dipole interactions**	**Dispersion forces**

4. For each of the species listed in the table below draw the structural formula, including all valence electrons, and sketch the shape.

Species	Structural formula	Shape
Amide ion NH_2^-		
Ammonium ion NH_4^+		
Azide ion N_3^-		

(6 marks)

5. For each of the following pairs of substances, state which has the higher melting point and indicate which force is responsible for the difference.

Pair of substances	Higher melting	Force
Cl_2 and P_4		
CH_3OH and C_2H_6		
CO_2 and SiO_2		
Mg and Ba		

(6 marks)

6. Fill in the boxes in the table below with a species, chosen from the list provided, that matches the description in the box. Only one answer per box is required.
CH_4 CH_2O CH_2Cl_2 NO_2^- HF Na^+ SO_3 Cl_2 H_2O NH_3

A bent, polar species	A non-polar species	A species that can form hydrogen bonds between its molecules
A tetrahedral, polar species	A species that contains only non-polar bonds	A pyramidal species

(6 marks)

7. The following table gives some data about three elements in the fourth row of the Periodic Table.

Element	**Melting point ^oC**	**First ionisation energy MJ mol^{-1}**	**Electrical conductivity MSm^{-1}**
Potassium	63	0.43	14
Germanium	937	0.77	10^{-6}
Bromine	-7	1.15	10^{-16}

Account for the way in which the values relate to the structure of the elements at the atomic level.

(6 marks)