



1 Give the formula of the following ions.

magnesium  $\text{Mg}^{2+}$  carbonate  $\text{CO}_3^{2-}$  zinc(II)  $\text{Zn}^{2+}$

2 Give the formula of the following ionic compounds.

sodium oxide  $\text{Na}_2\text{O}$  aluminium sulfide  $\text{Al}_2\text{S}_3$   
calcium hydroxide  $\text{Ca}(\text{OH})_2$  ammonium sulfate  $(\text{NH}_4)_2\text{SO}_4$

3 Identify the structure type of the following substances.

name	propane	diamond	buckminster -fullerene	potassium bromide	bromine	argon	copper oxide	zinc
formula	$\text{C}_3\text{H}_8$	C	$\text{C}_{60}$	KBr	$\text{Br}_2$	Ar	CuO	Zn
giant covalent		✓						
ionic				✓			✓	
metallic								✓
molecular	✓		✓		✓			
monatomic						✓		

4 This question is about some different forms (allotropes) of the element carbon.

a Explain why diamond, graphite and graphene have high melting points.

**have giant covalent structures**  
**need to break covalent bonds to melt**  
**covalent bonds are strong**

b Explain why graphite and graphene conduct electricity.

**has some delocalised electrons (one from each atom)**  
**so can carry charge through the substance**

c Explain why diamond is hard but graphite is soft.

**diamond: each C atom makes 4 covalent bonds in rigid 3D-network**  
**graphite: each C atom makes 3 covalent bonds forming layers; weak forces between layers**