1 Give the formula of the following ionic compounds.

potassium carbonate **K_2CO_3** aluminium hydroxide **$Al(OH)_3$**

calcium nitrate **$Ca(NO_3)_2$** sodium bromide **NaBr**

2 Identify the structure type of the following substances.

name	silver nitrate	silicon oxide	helium	ammonia	copper	buckminster -fullerene	graphene	sucrose
formula	$AgNO_3$	SiO_2	He	NH_3	Cu	C_{60}	C	$C_{12}H_{22}O_{11}$
giant covalent		✓					✓	
ionic	✓							
metallic					✓			
molecular				✓		✓		✓
monatomic			✓					

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

	melting point (°C)	boiling point (°C)	electrical conductivity as		structure type				
			solid	liquid	giant covalent	ionic	metallic	molecular	monatomic
A	583	861	does not conduct	conducts		✓			
B	–35	12	does not conduct	does not conduct				✓	
C	1538	2862	conducts	conducts			✓		
D	1414	3265	does not conduct	does not conduct	✓				
E	44	280	does not conduct	does not conduct				✓	
F	–248	–246	does not conduct	does not conduct					✓

4 Gold nanoparticles have different properties to bulk gold.

a What are nanoparticles? **particles between 1 and 100 nm in size**

b Why do gold nanoparticles have different properties to bulk gold?

nanoparticles have higher surface area to volume ratio (or higher % of atoms on its surface)

5 Calculate the surface area to volume ratio of a cube with sides 5 cm long.

surface area = 6 x 5 x 5 = 150 cm^2
volume = 5 x 5 x 5 = 125 cm^3
surface area : volume ratio = 150 : 125 = 6 : 5 (or 1.25 : 1)