Lattice Energy Questions

1) In each of the following use the formula to work out the charge on the metal ion and then use that to predict the formula of the second compound

   a) The formula for samarium oxide is Sm_2O_3. The formula for the chloride of samarium would be:

   b) The formula for a compound of Manganese is MnF_4. The formula of the oxide of Mn is expected to be

   c) The formula of praseodymium nitrate is $Pr(NO_3)_4$. The formula of calcium arsenate is $Ca_3(AsO_4)_2$. The formula of praseodymium arsenate is

2)

   a) Put these positive ions in order of their size from smallest to largest:

   Mg^{2+} Na^{+} Ca^{2+} Li^{+} Al^{3+} K^{+}

   b) Do the same for these:

   Cl^{-} O^{2-} F^{-} N^{3-} S^{2-} Ar

   c) Which combination of these ions would be expected to give the highest lattice energy? Why?

   d) And the lowest?
   Why?

3)

   a) Write the equation to show the lattice energy of sodium oxide

   b) Would you expect sodium oxide to have a more endothermic lattice energy than magnesium oxide? Justify your answer in terms of both charge and size of ions.

4) Five compounds (A-E) have the following lattice energies (in KJ/mol)

A	B	C	D	E
817	2161	3832	2258	2957

The compounds are known to be Rubidium Oxide, Potassium Fluoride, Calcium Chloride, Magnesium Fluoride and Beryllium Sulphide.
Identify A-E

Based on your answers does charge or size have a greater effect on lattice energy?

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5) For the five compounds in question 4, put them in order of increasing amount of distortion (least distorted first). Explain your reasoning.

6) The table gives both experimental and theoretical lattice energies for a series of silver halides. A comparision of the values gives an insight into the level of distortion

	Experimental (KJ/mol)	Theoretical (KJ/mol)
AgF	967	953
AgCl	915	864
AgBr	904	830
AgI	889	808

a) State and explain the trend in experimental values for AgF to AgI

b) For each compound calculate the difference between the experimental and theoretical values. Is there a trend? If so, why?