SL & HL Questions on Periodic trends

1. i. Explain why the atomic radius of sodium (Z = 11) is bigger than the atomic radius of chlorine (Z = 17).

ii. Explain why the atomic radius of the elements increases upon descending group 17 (F ⟶ I).

2. Suggest how the values for the atomic radii of the noble gases given in Section 9 in the IB Chemistry data booklet have been obtained.

3. Suggest two reasons why the ionic radius of a sodium ion is much smaller than the atomic radius of a sodium atom.

4. Three negative ions are the phosphide ion, P^{3-}, the sulfide ion, S^{2-} and the chloride ion, Cl^{-}. Place these three ions in order of increasing size (smallest first) and explain your logic.

5. Give the equations for the reaction of water with:

i. sodium oxide, Na_2O.

ii. magnesium oxide, MgO

iii. phosphorus(V) oxide, P_4O_{10}.

iv. sulfur(VI) oxide, SO_3.

6. Describe and explain (with a relevant equation) what will be observed when chlorine water is added to:

i. a solution of chloride ions.

ii. a solution of bromide ions.

iii. a solution of iodide ions.

7. State what will be observed when sodium metal is placed in water and give the equation for the reaction.

8. Suggest one reason why caesium is more reactive than lithium when it is placed in water.

9. State what will be observed when a piece of warm sodium metal is lowered into in a gas jar containing chlorine gas and give the equation for the reaction.

10. Aluminium oxide, Al_2O_3, has a high melting point and it reacts with both hydrochloric acid and sodium hydroxide. What can be deduced about the chemical nature of aluminium oxide from this information?