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Elemental & Environmental Chemistry *Assignment 1*

1. Write, using subshell notation, the electron configuration of:
   (a) Ca /1
   (b) Sr /1
   (c) Br^- /2
   (d) Fe^{3+} /2
   (e) Cu^{2+} /2

2. Identify the block of the periodic table in which each of the following elements is found:
   (a) Mg /1
   (b) Zr /1
   (c) Nd /1
   (d) Cl /1

3. Sodium is found on the left of the periodic table, aluminium near the middle, and phophorus to the right.
   (a) Compare the nature of elements sodium, aluminium and phosphorus and relate this to their electronegativity. /3

   The trends in nature and electronegativity are reflected in changes in the acidic-basic nature of oxides.
   (b) Compare the nature of the oxides of sodium, aluminium and phosphorus, including two equations for each. /6

4. When XO_2 dissolves in water the solution is acidic. Name two elements that could be X. Write equations for their reactions with water. /3

5. Y_2O_3 represents the formula of a basic oxide of a transition element.
   (a) Name an element that could be represented by Y. /1
   (b) Write two equations for the oxide which illustrate its basic nature. /3

6. The transition elements copper and zinc have the same general formula for their oxides MO. However, one is a basic oxide and the other is an amphoteric oxide. Write equations to distinguish the nature of the two oxides. /4

7. Solid elements, coded as G, J and Q, belong to the same period of the Periodic Table, and form oxides with the following properties:

   GO_3 reacts with water to form a strongly acidic solution

   J_2O_3 reacts with acids and bases (hydroxide ions)

   Q_2O reacts with water to form hydroxide ions.

   (a) State which oxides would be acidic, basic or amphoteric. /3
   (b) State, giving reasons, which of G, J or Q is most electronegative and which is least electronegative. /3
   (c) Predict the likely group numbers for G, J and Q. /3

TOTAL /41