

Questions on the reactions of the elements and compounds of group 2.

① a. Arrange the following ions in order of increasing ionic radius: Ba^{2+} , Mg^{2+} , Sr^{2+} , Ca^{2+} . [2]

b. State and explain the changes in atomic radius which occur with increase in atomic number in group 2. [3]

c. Which of the group 2 elements would you expect to react most vigorously with water, and why? [5]

② a. Write a balanced equation, with state symbols, for the reaction between:

i) Calcium and oxygen [2]

ii) Calcium oxide and water [2]

iii) calcium hydroxide solution and carbon dioxide. [2]

b. Despite the greater first and second ionization energies of magnesium, it appears to burn much more vigorously in air than barium does. Suggest an explanation. [4]

③ The melting points of the oxides of four group 2 metals are, in no particular order, 2430, 2850, 3600 and 1920°C. Match each oxide of Mg, Ca, Sr and Ba with its correct melting point and explain this order. [4]

④ a. Write an equation for the thermal decomposition of a group 2 nitrate, $M(NO_3)_2$ where M represents a group 2 element. [3]

b. For which metal in group 2 does this reaction occur i) least easily ii) most easily? [2]