

Answer on the question #68055, Chemistry / Physical Chemistry

Question:

a) For K^+ and Br^- find the radius ratio of K^+ ion to Br^- ion and on this basis predict the shape of crystal geometry of KBr . Draw a diagram indicating the arrangement of K^+ and Br^- ions in the crystal of KBr .

Answer:

Radius ratio rule states that particular crystal packing type is possible only for the particular range of ratios of ions. Let's calculate the ratio of potassium cation and bromide anion, using effective ionic radii of Shannon:

$$\frac{r_+}{r_-} = \frac{138 \text{ pm}}{196 \text{ pm}} = 0.704$$

According to the radius ratio rule, if the ratio is in range (0.414-0.732), the arrangement of ions is octahedral, probably type $NaCl$.

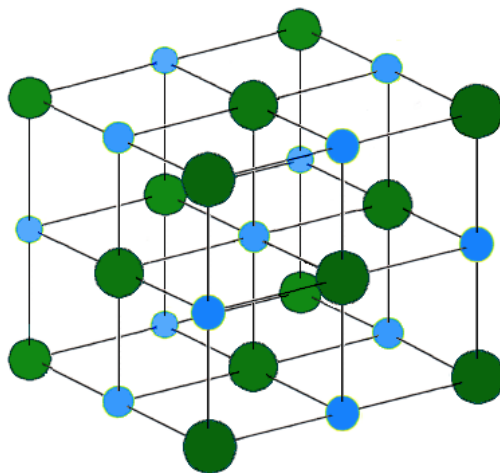


Figure 1. Crystal structure of KBr . Blue - potassium cation, green - bromide anion.