

¹Introduction to Crystal Structures: Bond Strength (Pauling's Rule #2)

Notes or Instructors

Suggestion to instructors

Before having students do this exercise, I generally have them do a similar one related to Pauling's first rule (ionic size and coordination number). I also give them a very brief (1 minute) introduction to ionic bond strength, basically just telling them how to calculate it.

Required materials

You will need crystal model for students to use as they answer these questions. If you do not have the same models as those listed above, you can easily substitute. The exercise as written requires three traditional ball and stick models (the standard sort with all balls the same size): quartz, calcite, albite. Additionally, it uses three models made of marbles/spheres with marbles of different sizes (depending on ion size): sphalerite, wurtzite, olivine.

Group activity

This could be done as an individual assignments but works better as a group activity because some of the questions do a good job promoting discussion.

Alternative

Recently, Mogk and Ratajeski (2005) have made available an exercise similar to this one that uses computer graphics programs instead of ball and stick models. It can be found at

http://serc.carleton.edu/research_education/crystallography/discovery/index.html.

¹The idea for this exercise came from: Mogk, D. (1997) Directed-Discovery of Crystal Structures Using Ball and Stick Models (*in* Brady, J.B., Mogk, D.W., and Perkins, D., eds., Teaching Mineralogy, The Mineralogical Society of America, p283-290)