

INVESTIGATION 2

PURPOSE

To compare the similarities and differences between the diamond and zinc blende (ZnS) structures. To understand why zinc blende is said to demonstrate AZ stoichiometry.

PROCEDURE

If models of diamond and zinc blende have been made available to you, look at them carefully as you answer the following questions. If you are assigned to build one or both of the models yourself, follow the instructions on pages 23 and 51 of the manual that accompanies the ICE Solid State Model Kit.

FOLLOW-UP QUESTIONS

1. How many nearest neighbors does each carbon atom in the diamond structure have? How many nearest S neighbors does each Zn in the ZnS structure have? How many nearest Zn neighbors does each S in the ZnS structure have?
2. What is the name of the shape defined by the nearest neighbors to each C in the diamond structure? To each Zn by S atoms in the ZnS structure? To each S by Zn atoms in the ZnS structure?
3. How many atoms of C are in the diamond unit cell? How many atoms of Zn are in the ZnS unit cell? How many atoms of S are in the ZnS unit cell?
4. How are these structures similar? How are they different?
5. How does the zinc blende structure demonstrate AZ stoichiometry? (Stoichiometry refers to the quantitative relationship between the atoms in the structure, and AZ indicates two different atoms in a 1:1 ratio.)
6. Draw the z-layer sequence showing the position of the atoms at $z = 0, 1/4, 1/2,$ and $3/4$ for both diamond and zinc blende.

