

NAME _____

Dr. Garofalini

See due date on Website Syllabus

Print out and answer on this page

1. List the atom positions for the Fe and Zn in the crystals given below, in units of axial lengths.
2. How many formula units of ZnCl_2 exist in the unit cell?

ANSWER _____

3. What does F (in $\text{Fm}\bar{3}\text{m}$) mean in the Table 29 below?

ANSWER _____

4. Where are the symmetry elements located in the crystal (using our nomenclature for locations)?

5. How many imaginary lattice points are in the unit cell of the crystal in Table 29?

ANSWER _____

6. How many atoms are in the unit cell in the ZnCl_2 crystal?

ANSWER 2nd crystal _____Data Table 29 $(\text{NH}_4)_3\text{FeF}_6$ Cubic, space group $\text{Fm}\bar{3}\text{m}$, No. 225; $a = 9.10\text{\AA}$; $Z = 4$, $V = 753.57\text{\AA}^3$ *Atomic Positions:*

Fe in 4(*a*): 0,0,0; fc
 F in 24(*e*): $\pm(x,0,0; 0,x,0; 0,0,x)$; $x=0.20$; fc
 NH_4 (1) in 4(*b*): $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$; fc
 NH_4 (1) in 8(*c*): $\pm(\frac{1}{4}, \frac{1}{4}, \frac{1}{4})$; fc

Data Table 2 $\alpha\text{-ZnCl}_2$ (9)Tetragonal, space group $\text{I}\bar{4}2\text{d}$, No. 122; $a = 5.398\text{\AA}$, $c = 10.33\text{\AA}$; $Z = 4$; $V = 300.99\text{\AA}^3$ *Atomic Positions:*

Zn in 4(*a*): 0,0,0; 0,1/2,1/4; bc
 Cl in 8(*d*): $x, 1/4, 1/8$; $\bar{x}, 3/4, 1/8$; $3/4, x, 7/8$; $1/4, \bar{x}, 7/8$; bc; $x = 0.25$