

3.23 Here we are asked list point coordinates for both sodium and chlorine ions for a unit cell of the sodium chloride crystal structure, which is shown in Figure 12.2.

In Figure 12.2, the chlorine ions are situated at all corners and face-centered positions. Therefore, point coordinates for these ions are the same as for FCC, as presented in the previous problem—that is, 000, 100, 110, 010, 001, 101, 111, 011, $\frac{1}{2}\frac{1}{2}0$, $\frac{1}{2}\frac{1}{2}1$, $1\frac{1}{2}\frac{1}{2}$, $0\frac{1}{2}\frac{1}{2}$, $\frac{1}{2}0\frac{1}{2}$, and $\frac{1}{2}1\frac{1}{2}$.

Furthermore, the sodium ions are situated at the centers of all unit cell edges, and, in addition, at the unit cell center. For the bottom face of the unit cell, the point coordinates are as follows: $\frac{1}{2}00$, $1\frac{1}{2}0$, $\frac{1}{2}10$, $0\frac{1}{2}0$.

While, for the horizontal plane that passes through the center of the unit cell (which includes the ion at the unit cell center), the coordinates are $00\frac{1}{2}$, $10\frac{1}{2}$, $\frac{1}{2}\frac{1}{2}\frac{1}{2}$, $11\frac{1}{2}$, and $01\frac{1}{2}$. And for the four ions on the top face $\frac{1}{2}01$, $1\frac{1}{2}1$, $\frac{1}{2}11$, and $0\frac{1}{2}1$.