

12.6 We are asked to cite the cations in Table 12.3 which would form fluorides having the cesium chloride crystal structure. First of all, the possibilities would include only the monovalent cations Cs^+ , K^+ , and Na^+ . Furthermore, the coordination number for each cation must be 8, which means that $0.732 < r_{\text{C}}/r_{\text{A}} < 1.0$ (Table 12.2). From Table 12.3 the $r_{\text{C}}/r_{\text{A}}$ ratios for these three cations and the F^- ion are as follows:

$$\frac{r_{\text{Cs}^+}}{r_{\text{F}^-}} = \frac{0.170 \text{ nm}}{0.133 \text{ nm}} = 1.28$$

$$\frac{r_{\text{K}^+}}{r_{\text{F}^-}} = \frac{0.138 \text{ nm}}{0.133 \text{ nm}} = 1.04$$

$$\frac{r_{\text{Na}^+}}{r_{\text{F}^-}} = \frac{0.102 \text{ nm}}{0.133 \text{ nm}} = 0.77$$

Thus, only sodium will form the CsCl crystal structure with fluorine.