

12.34 (a) For  $\text{Ca}^{2+}$  substituting for  $\text{Li}^+$  in  $\text{Li}_2\text{O}$ , lithium vacancies would be created. For each  $\text{Ca}^{2+}$  substituting for  $\text{Li}^+$ , one positive charge is added; in order to maintain charge neutrality, a single positive charge may be removed. Positive charges are eliminated by creating lithium vacancies, and for every  $\text{Ca}^{2+}$  ion added, a single lithium vacancy is formed.

(b) For  $\text{O}^{2-}$  substituting for  $\text{Cl}^-$  in  $\text{CaCl}_2$ , chlorine vacancies would be created. For each  $\text{O}^{2-}$  substituting for a  $\text{Cl}^-$ , one negative charge is added; negative charges are eliminated by creating chlorine vacancies. In order to maintain charge neutrality, one  $\text{O}^{2-}$  ion will lead to the formation of one chlorine vacancy.