685.

Problem 47.35 (RHK)

Monochromatic x rays are incident on a set of NaCl *crystal whose interplanar spacing is 39.8 pm. When the beam is rotated* 51.3^0 *from the normal, first-order Bragg reflection is observed. We have to find the wavelength of the x rays.*

Solution:

It is given that the Bragg reflection occurs when the beam is incident at an angle of 51.3^0 from the normal to the crystal planes. Therefore, the Bragg angle will be

$\theta = 90^0 - 51.3^0 = 38.7^0$.

For the first order Bragg reflection, we have the equation

$2d \sin \theta = \lambda$,

where d is the interplanar spacing. For the NaCl crystal

$d = 39.8$ pm.

Therefore,

$\lambda = 2 \times 39.8 \times \sin 38.7^0$ pm $= 49.76$ pm.