

**678.**

**Problem 47.21 (RHK)**

*The “sodium doublet” in the spectrum of sodium is a pair of lines with wavelengths 589.0 and 589.6 nm. We have to calculate the minimum number of rulings in a grating needed to resolve this doublet in the second-order spectrum.*

**Solution:**

The resolving power for a grating is given by the equation

$$\frac{\lambda}{\Delta\lambda} = mN,$$

where  $N$  is the number of rulings in the grating and  $m$  is the order of the grating spectra.

For the “sodium doublet”

$$\Delta\lambda = 0.6 \text{ nm},$$

and

$$\lambda = 589 \text{ nm}.$$



Therefore, in order that the “sodium doublet” are resolved in the second order of the grating spectra, the minimum number of rulings in the grating has to be

$$N = \frac{589 \text{ nm}}{2 \times 0.6 \text{ nm}} = 491.$$

