

34. The angular location of the  $m$ th order diffraction maximum is given by  $m\lambda = d \sin \theta$ . To be able to observe the fifth-order maximum, we must let  $\sin \theta|_{m=5} = 5\lambda/d < 1$ , or

$$\lambda < \frac{d}{5} = \frac{1.00 \text{ nm}/315}{5} = 635 \text{ nm} .$$

Therefore, all wavelengths shorter than 635 nm can be used.