Consider neutrons that have a de Broglie wavelength of 0.09 nm. A beam of these neutrons is incident on a crystal, and interference effects between waves scattered off different atoms is observed.

1) What is the kinetic energy of each neutron?

2) A second-order scattering maximum is found at 85 degrees from the normal. What is the separation between atoms in the crystal?

3) If the neutron beam were replaced by a beam of electrons having the same kinetic energy, how would the scattering angle change (if at all)? Show work or explain clearly for full credit.

4) Now imagine that the beam of neutrons is replaced by a beam of xrays having the same momentum. What is the energy of the xrays?