PHYS 321 X-ray Diffraction Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Bragg’s law:

Additional Conditions: BCC: *h+k+l*=even FCC: h,k,l either odd or even

1. The 2ϴ values in degrees for first order diffraction peaks are given below for a metal with cubic structure, using X-rays of wavelength 0.1542 nm: 44.48, 51.83, 76.35, 92.9, 98.4, 121.87, 144.54, 155.51.

(a)Determine the crystal structure.

(b)Determine the lattice constant.

(c) Determine the ionic radius.

(d) Identify the metal.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2θ (deg.) | θ (rad) | Sin2θ | Normalize | ClearFractions | h2+k2+l2 | (hkl) | $$\frac{Sin^{2}θ}{h^{2}+k^{2}+l^{2}}$$ |
| 44.48 |  |  |  |  |  |  |  |
| 51.83 |  |  |  |  |  |  |  |
| 76.35 |  |  |  |  |  |  |  |
| 92.9 |  |  |  |  |  |  |  |
| 98.4 |  |  |  |  |  |  |  |
| 121.87 |  |  |  |  |  |  |  |
| 144.54 |  |  |  |  |  |  |  |
| 155.51 |  |  |  |  |  |  |  |