Characterization of Materials 635:309

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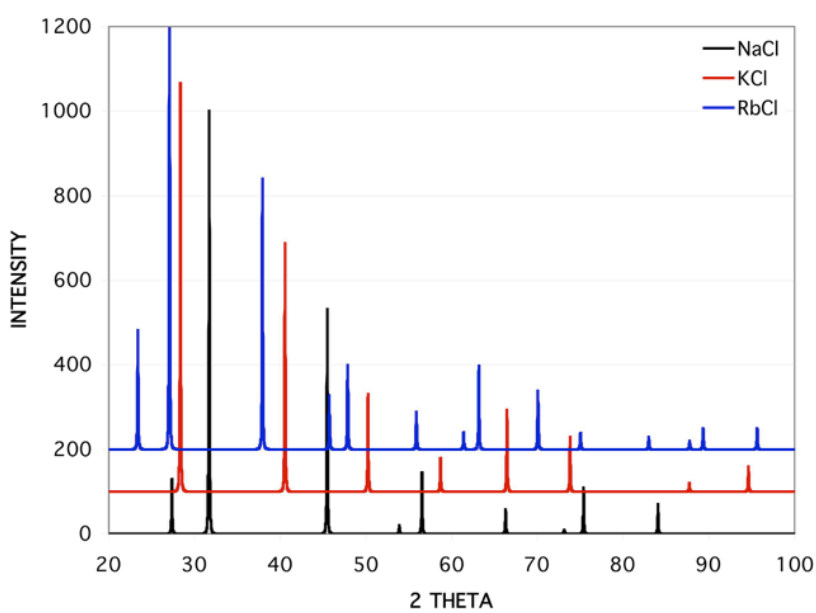
1) Below shows the diffraction patterns of 3 compounds, NaCl, KCl, and RbCl, with the table of the d-spacing, peak intensities, and (hkl) values of each peak for each sample on the second page. Notice the ordering of the peaks for NaCl and RbCl are 2-1-2-1..., but this is not the case for KCl. Of course, KCl has the same structure as the others (the sodium chloride structure - see the section 4 in Cullity). Is there some obvious pattern in what peaks are present and what are not in comparing these 3 compounds?
Be very specific with your answers and prove numerically why there are peaks missing in the KCl pattern and:
   (a) Explain in detail why the peaks that are seen in NaCl and RbCl are missing in the KCl pattern using the Structure Factor equation and numbers that can be put into the equation. Remember that I is related the square of F. Assume that the form factor (atomic scattering factor) has a value consistent with the number of electrons in each atom (assume f doesn't change with sin θ/λ).

ATOM	atomic wt.	Z (Atomic number)
Na	23	11
Cl	35	17
K	39	19
Rb	85	37



d (Å)	I	(hkl)
NaCl		
3.26	13	111
2.82	100	200
1.99	55	220
1.70	2	311
1.62	15	222
1.41	6	400
1.29	1	331
1.26	11	420
1.52	7	422
KCl		
3.15	100	200
2.22	59	220
1.82	23	222
1.57	8	400
1.41	20	420
1.28	13	422
1.04	6	600
RbCl		
3.8	29	111
3.29	100	200
2.37	65	220
1.98	13	311
1.9	20	222
1.65	9	400
1.51	4	331
1.47	20	420
1.34	14	422