

1. (a) Assuming use of a lead (Pb) shield for the protection of personnel in an x-ray diffractometer is 0.05mm thick. Calculate the 'transmission factor' (I_x/I_o) of such a shield for the Cu $K\alpha$. (Appendix 8 in website has necessary data.)

(b) How thick would the shield have to be in order to get the same transmission factor as in (a) if it was composed of 40% Pb and 60%Al (by weight) and a density based on the sum of the individual densities based on the weight %s of each given here (density of elements also given in Appendix 8 in website).
3. Calculate the mass absorption coefficients of air for Cu $K\alpha$ radiation. Assume that air contains only 80% nitrogen and 20% oxygen by weight and has a density of 1.29×10^{-3} g/cc.