Compton scattering:

1. Give the formula for the electron energy vs. scattering angle.

2. What are the maximum and minimum photon and electron energy and at which scattering angles are these obtained ?
    Calculate these values for an incoming photon energy of 100, 500 and 1000 keV.

3. For high photon energies, the minimum energy of the scattered photon tends towards a constant value. What is this value ?

4. Find the maximum energy that can be deposited by a 1 MeV gamma photon if it undergoes two successive Compton scattering events and then escapes the detector.

5. The immediate environment of an accelerator or reactor contains large fluxes of gamma rays of energies between 5 and 10 MeV. What thickness (in cm) of lead is required to reduce the photon intensity by a factor of 10^{12} ? The density of lead is 11.34 g/cm^3. Use the figure below.
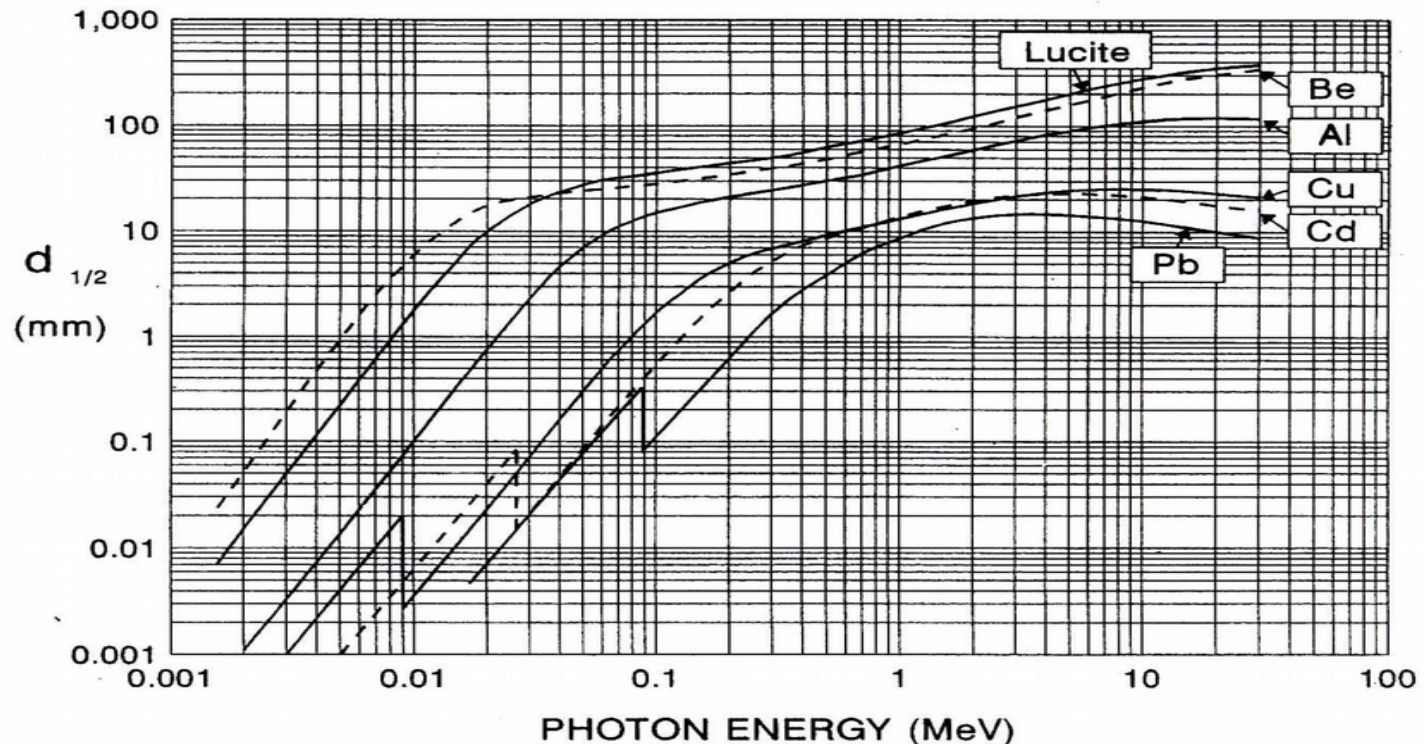

Figure 7-7 Half-thicknesses (in mm) for some frequently used absorber materials computed with the present procedure. The lead curve is not extended below 20 keV, because of the vicinity of the L_I absorption edge. The accuracy of these curves is in practice the reading accuracy. "Lucite" (polymethyl methacrylate) is also called "Perspex" or Plexiglass".