$2 \times (2/3)\lambda_t$ to the 150.49 cm, making a = 153.29 cm (λ_t = 2.1 cm). As L depends on density, it is conventional to reduce all values of L to the value L would be if the density were 1.60 gm/cm^3. This makes it possible to compare directly different lots of graphite tested in this way.

In the following table, some of the results obtained in this manner for four common substances are listed.

TABLE 3 – DIFFUSION LENGTHS AND RELATED CONSTANTS FOR H_2O, D_2O, Be, AND C

	DENSITY, G/CM^3	ATOMS/CM^3	L, CM	L^2/Λ, CM
H_2O	1.0	0.0334×10^{24}	2.85	0.142
D_2O	1.1	0.0331×10^{24}	100	0.80
BE	1.8	0.1235×10^{24}	31	0.87
C	1.62	0.0871×10^{24}	50.2	0.903

The microscopic constants in problems such as those just described are usually two: σ_s the scattering cross section, and σ_a, the absorption cross section. These are related to L, , and λ_t in the following manner:

$$\lambda_t = \frac{\lambda}{1-(\cos\phi)_{av}}, \qquad \lambda = \frac{1}{n\sigma_s}$$

$$v\theta = \Lambda = \frac{1}{n\sigma_a}; \quad N = \frac{\sigma_s}{\sigma_a} = \frac{\Lambda}{\lambda} \tag{7-13}$$

$$L^2 = \frac{\lambda_t \Lambda}{3}$$

Definitions of the different symbols are:

- n = atoms/cm^3
- v = neutron velocity
- θ = mean lifetime for absorption
- $(\cos\phi)_{av}$ = average of the cosine of the angle of scattering in the lab system = 2/(3A) for isotropic scattering (A is mass number)
- λ_t = transport mean free path
- λ = mean free path for scattering
- = absorption mean free path
- L = diffusion length
- N = average number of scattering collisions made per absorption

7.4 THE ALBEDO OR THE REFLECTIVITY OF BOUNDING SURFACES FOR NEUTRONS

So far in this chapter, we have outlined the methods of obtaining neutron distributions in media due to sources within them. However, neutrons are often introduced into a medium from the outside. It is convenient to define a reflectivity, or, as it is called, albedo ("whiteness" in Latin), for a surface. It is simply the fraction of the incident neutrons eventually returned or "reflected" from the surface. An albedo of unity means perfect reflection; an albedo of zero

a-93-81