

**Copy of a printed table referenced as "Relative number of molecules of the various types of protoplasmic materials"**

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*Relative Number of Molecules of the Various Types of Protoplasmic Materials*

SUBSTANCE	PERCENTAGE OF FRESH WEIGHT	AVERAGE MOLECULAR WEIGHT	NUMBER OF MOLECULES IN RELATION TO PROTEIN
Water	85	18	18,000
Protein	10	36,000	1
Fatty substances	2	700	10
Other organic materials	1.5	250	20
Inorganic material	1.5	55	100

Iowa, Iowa State College Press, p. 46.

It is instructive to compare the relative numbers of molecules in the different constituents of protoplasm (see Table 8.2). The relative numbers of molecules can be determined from the amount of each substance and from the average molecular weight of each class. For purposes of calculation protein is arbitrarily assigned an average molecular weight of 36,000. Calculation discloses that for every protein molecule 18,000 water molecules are available. From the table one may observe that in spite of the comparatively large percentage of protein content of protoplasm, the protein molecules in protoplasm are present in smallest numbers.<sup>7</sup> The data in the table are useful since they indicate the availability of the various molecules for combination with protein or for osmotic action.

**Water, Free and Bound**

Cell foods reach the cell dissolved in water, and apparently all the chemical reactions of importance to life occur in aqueous solution. Water