Shelling

The proper method to solidly freeze samples is by “shell freezing.” This method distributes the material being frozen about the inner wall of the flask so that it forms a hollow cylinder. This shape presents the most ideal form for samples to be freeze-dried. In operation, heat is withdrawn from the samples by a thin film of –40°C alcohol pumped through a mechanically refrigerated heat exchanger across the entire effective length of the moving belts from openings in the back surface of the reservoir. The rolling action between the container and belts causes the refrigerated alcohol to contact and ride with the outer wall of the flask while the liquid sample freezes to the inner wall in the form of a shell. Using the QD-75 flasks, up to 12 ml of sample can be “shelled” with the flasks lying flat (0 degrees) on the shell freezer belt. For larger samples, up to 37 ml, it is necessary to tilt the belt platen in order to prevent the sample from contacting the mouth of the flask and blocking the filter with ice. As these larger samples freeze, the level of the remaining liquid will fall, so as the product adheres to the wall of the flask, the platen may be adjusted to a more acute angle. This will help produce a more uniform thickness in the frozen product throughout the length of the container. This is optimum shelling.