Noise
Any laboratory operation that produces significant noise (85 decibels or greater) needs a hearing conservation program to protect employees from excessive exposure, that is, exposure to significant noise for an 8-hour average duration. An audiologist or industrial hygienist should be consulted to determine the need for such a program and to provide assistance in developing one.

Ultrasonicators
The use of high intensity ultrasound in the chemical laboratory has grown enormously during the past decade and has a diverse set of applications. Human exposure to ultrasound with frequencies of between 16 and 100 kilohertz (kHz) can be divided into three distinct categories: airborne conduction, direct contact through a liquid coupling medium, and direct contact with a vibrating solid.

Ultrasound through airborne conduction does not appear to pose a significant health hazard to humans. However, exposure to the associated high volumes of audible sound can produce a variety of effects, including fatigue, headaches, nausea, and tinnitus. When ultrasonic equipment is operated in the laboratory, the apparatus must be enclosed in a 2-cm thick wooden box or a box lines with acoustically absorbing foam or tiles to substantially reduce acoustic emissions (most of which are inaudible).

Direct contact of the body with liquids or solids subjected to high-intensity ultrasound of the sort used to promote chemical reactions should be avoided. (In contrast, ultrasound used for medical diagnostic imaging is relatively benign.) Under sonochemical conditions, cavitation is created in liquids, and it can induce high energy chemistry in liquids and tissues. Cell death from membrane disruption can occur even at relatively low acoustic intensities. Exposure to ultrasonically vibrating solids, such as acoustic horn, can lead to rapid frictional heating and potentially severe burns.

Excerpts from “Prudent Practices in the Laboratory” National Academy Press 1995; pgs. 118, 120