PWC CORONADO LABORATORY PREVENTS INJURIES AND CTD'S WITH AUTOMATIC SHAKER FOR SEPARATORY FUNNELS

Laboratory technicians risk chemical injuries and burns every day from hazardous chemicals. They are also exposed to some ergonomic hazards that may be found in other work environments. Laboratory ergonomic hazards include maintaining awkward and static postures, repetitive motions, strain on muscles and tendons of the neck, arms, legs and lower back, contact stresses from prolonged gripping of funnels and other laboratory glassware, and fatiguing vibration of the arms and shoulders due to working with certain laboratory equipment. Ergonomics is the science of fitting the work to the worker, instead of requiring the worker to adapt to existing working conditions.

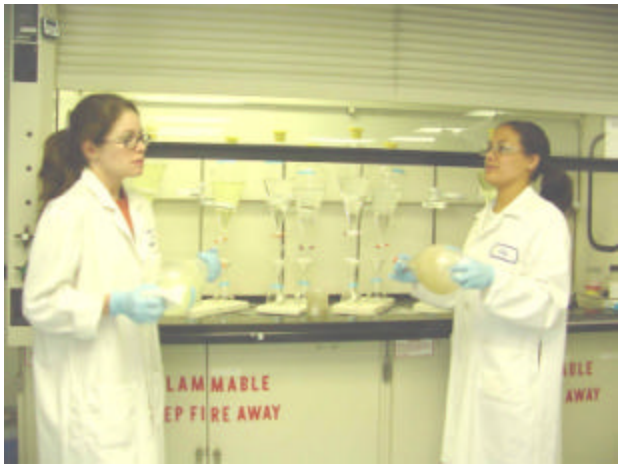
Separatory funnels, with liquid chemicals, in holders

At Public Works Center (PWC), Naval Base Coronado, in San Diego, California, laboratory technicians in the Environmental Department routinely use separatory funnels. A separatory funnel is a stoppered glass funnel that is used to separate multiple chemical compounds in each sample. The sample size is typically one-liter since that is the volume that is specified by the Environmental Protection Agency (EPA) methods for analyzing for environmental contaminants. As shown in the photograph at left, separatory funnels have stoppers and stopcock valves to prevent leakage when the funnel is shaken or agitated. Agitation is periodically interrupted, and the stopcock is opened to release the pressure that builds up in the separatory funnel during agitation. The separation process removes matter from the environmental sample that would otherwise interfere with identification of the category and the amount of the chemicals that are being analyzed.

Extractions used to be accomplished at the PWC Environmental Laboratory by a hand-held method that was often a lengthy and laborious process for lab technicians. Each sample was placed in a different separatory funnel, each of which a technician had to shake six successive times. The funnels had to be shaken by hand for one and one-half minutes each of the six times. Since a typical batch to be tested consists of ten samples, technicians had to agitate the samples by hand for a total of 90 minutes per batch.

Shaking separatory funnels by hand

Laboratory technicians used to *pinch grip* separatory funnels while agitating them by hand. The *pinch grip* hold is shown in the photograph, below. Over time, pinch gripping resulted in hand and wrist discomfort for laboratory technicians. Continual shaking of the arm and shoulder also led to fatigue. In addition, the Environmental Department's laboratory technicians complained of leg strain and neck, arm, and lower back pain due to hand shaking of separatory funnels as well as standing and reaching while working with the chemical samples in a laboratory fume hood.



Outmoded pinch-grip method for holding and shaking separatory funnels demonstrated

Work tasks that require maintaining an awkward posture for long periods of time can strain and fatigue the muscles used to hold that posture while working in that position. This strain may lead to a cumulative trauma disorder, or CTD, a name given to a group of disabilities that usually involve muscle weakness and discomfort. The discomfort often improves after discontinuing activities that weaken the affected muscles and getting medical treatment for the CTD. Work tasks that included chemical extractions used to put workers at risk for developing repetitive strain injuries and CTDs.

The Environmental Department at PWC Coronado requested that Ms. Christina Graulau, the laboratory's Safety Coordinator, identify and evaluate ergonomic hazards associated with using hand-held glass separatory funnels. Her findings were provided to the PWC Employee Driven Cultural Safety Forum (EDCSF) for their review and recommendations. The EDCSF is a committee made up of safety representatives from each workshop at PWC Coronado. It meets monthly to discuss PWC safety concerns and to identify potentially workable solutions. The EDCSF obtained approval via the Executive Steering Committee to purchase one *automatic separatory funnel shaker* that accommodates up to four separatory funnels. Funding for the *automatic separatory funnel shaker* was provided by the Chief of Naval Operation's (CNO's) Hazard Abatement Program.

Automatic separatory funnel shaker eliminates shaking by hand

Use of the *automatic separatory funnel shaker* alleviates fatigue and the muscle strains that were previously caused by extended periods of shaking separatory funnels by hand. The *automatic separatory funnel shaker* also greatly reduces the length of standing time required by lab technicians during extractions. The automatic shaker times the simultaneous agitation of up to four separatory funnels for the required one and one

half-minute agitation periods. Using the automatic timer frees up technicians to work on other laboratory tasks during the separation procedure. When the automatic shaker is finished, the timer notifies laboratory personnel that the separation has been completed.

Automatic separatory funnel shaker reduces risks associated with hand shaking of funnels

The *automatic separatory funnel shaker* provides benefits in addition to ergonomic relief. Laboratory technicians now handle the glass funnels less frequently, reducing the risk of breakage, lacerations from broken glass, and chemical injuries and burns. The *automatic separatory funnel shaker* has greatly improved ergonomic comfort, productivity, and job satisfaction while lowering risk of occupational injuries and CTDs.

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