Safe Disposal of Household Mercury Containing Compact Fluorescent Light Bulbs

Arumugam, Marcolyn

Compact fluorescent light (CFL) bulbs are not disposed in an environmentally safe manner. The most serious threat to the environment is the toxic mercury vapour contained within CFL bulbs which is used to produce fluorescence. An environmentally safe household CFL bulb disposal system that removes the toxic mercury from the bulb was designed and built. The final system was developed and tested repeatedly by complexing the mercury with sea sand and sulphur. It was digested in nitric acid for analysis in the Inductively Coupled Plasma - Optical Emission Spectrometer. Three brands were each tested thrice and all showed a presence of mercury in the cartridge. The vapour was contained in a safe manner in a sealed complexing system and this prevented the negative impact on the environment. It was proven to be sealed by purging the system with pressurised air. The cartridge containing the 12mg of sulphur and 300g of sea sand can be reused 15 times per 5mg of mercury (1 CFL bulb). 6 out of 9 samples showed a mercury concentration of 3-5 mg. This is the average amount of mercury that is contained in a CFL bulb. The sample with a 6.7 mg concentration of mercury is an anomaly as CFL bulbs usually have a maximum of 5mg of mercury. The anomaly may be as a result of the system not being thoroughly cleaned during the testing or as a result of a higher mercury content in the bulb. The engineering goal has been achieved.

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