Vacuum Evaporator for Water Purification

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The world is heading towards an energy crisis due to the huge consumption of energy in many fields including, but not restricted to, distillation techniques. Thermal distillation technique, in particular, has a lot of strengths as it is one of the few practical ways to remove heavy metals and other salts that carbon filters cannot remove. However, it has a critical shortcoming that it is one of the most expensive home water treatment techniques, costing $0.25 to $0.35 worth of electrical energy per gallon of distilled water produced - depending on local electricity costs. Research shows that there other alternative solutions such as the Vacuum Evaporator. Our hypothesis depends on the fact that any liquid boils when its vapor pressure equals the atmospheric pressure surrounding it. In our system the atmospheric pressure is decreased until it is equal to the water vapor pressure thus reducing the boiling point of the water used. Consequently, this process will consume lower energy than thermal distillation techniques by 22% which was verified through our prototype testing process. This process has different economic, industrial and environmental applications. First, it is used to separate crude oil into more fractions for specific uses. Second, Water is distilled to remove impurities, such as salt from seawater. Third, liquid chemicals for diverse uses are often distilled after synthesis to remove impurities and unreacted starting materials. Finally, distillation of fermented solutions has been used since ancient times to produce distilled beverages with higher alcohol content. The premises where distillation is carried out, especially distillation of alcohol are known as a distillery.

Awards Won:

Third Award of $1,000