

An automated device to release a desired volume of a liquid from a container

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A simple automated device has been designed and constructed in order to release a desired volume of a liquid from a container. A solenoid valve is used to start and stop the release of liquid quickly. The time period of the solenoid valve kept open, which determines the volume of the released liquid, has been programmed electronically for a predetermined rate of flow of the liquid. This preliminary model was tested with water. The device released water at the average rate of $69.114 \pm 0.001 \text{ ml sec}^{-1}$. When the machine was programmed to release 550 ml and tested 50 times, 42%, 18% and 16% of the number of measurements were accurate within ± 0.1 , ± 0.2 and ± 0.3 ml, respectively and the highest deviation was one measurement with 550.6 ml.

By measuring the volume of water released in periods (T) of 1 s to 14 s, each repeating 10 times, and fitting the data, a linear relationship, $V=68.301T+8.3795$ with $r^2 = 0.9999$ was obtained for overall calibration to release any desired volume. With this calibration, the device was accurate within 0.5% of the desired volume when the released volume is greater than 300 ml. The error is higher at lower volumes, about 2% for releasing 100 ml.

The machine can be programmed for other liquids, such as kerosene oil and coconut oil so that the users could select the relevant function. There are several advantages of the machine, such as low manufacturing cost (Rs. 15,000.00), easy to manufacture locally, user friendly, less processing time (14 s to release 1000 ml), sufficiently accurate, and easily repairable. Further improvement of the accuracy is in progress including a mechanism to minimize power fluctuations of the motor.

Keywords: Desired liquid volume, Automated device

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