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ENVIRONMENT NEWS

Modification of distillation process in laboratories and industries to conserve water

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Distillation process is an important and very common process in laboratories and industries. During the process of distillation, vapours coming to condenser tubes are generally cooled by water flowing through condenser tube in the condenser unit of the apparatus. While making glass distilled water, water vapours obtained by heating it in a flask enters in condenser unit where these are cooled into liquid phase by water flowing through the condenser tube and collected as distilled water. In almost all laboratories the water used for cooling the condenser tube is coming from the water supply tap near the wash basin. This water after circulating through the condenser tube is left into the drain as wastewater (Fig.1). In a recent observation, when this water used for cooling the condenser tube was collected in a container to see how much water has been used for cooling the condenser tube, shocking figures were revealed i.e. to make 500 ml of distilled water approximating 40 liters of water is used for cooling which is left to go into the drain.

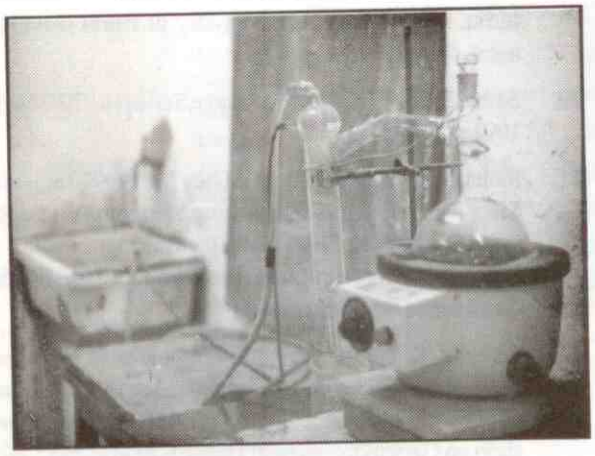


Fig.1. Conventional distillation unit

Quantity of distilled water required by a scientist or technician in an industry depends on the type of research requirement. If a scientist working on some parameters where about 2.5 liter of distilled water is used in a day which is a modest consumption, approximately 200 liter water is required in cooling unit of distillation plant for this purpose. If this requirement is calculated for 25 working days in a month, the quantity of water wasted by one user in a month comes to 5000 liters, and that's enormous. Thus, for a big research laboratory or a unit of an institution or in a small industry where the number of users of distilled water are about hundred, the amount of water wasted for cooling in condenser unit is estimated about 500000 liters/ month, which is a very shocking amount of water being wasted.

Recycling water in condenser Unit

To prevent this water going waste after cooling, a simple technical change was made in the existing technique. This change was recycling the water in condenser instead of leaving it into the drainpipe. Before it was allowed to enter again in condenser unit(recycling) it was cooled first by a simple indigenous cooling technique. Cooling technique involved connecting out let tube of condenser unit to an earthen pot of about 50 litre capacity siting on a cement container filled with wet sand. Once the earthen pot is filled ¾ from the water coming from condenser unit it is lifted to a reservoir tank of about 60 litre capacity placed at a height of 4 feet from the earthen pot, manually or with the help of a small submersible motor (Fig.2). Reservoir tank can be used as plastic or earthen material depending on convenience. Cooling is more effective if reservoir tank is also an earthen pot. By this way hot water coming from condenser cool down in the earthen pot before it is pumped back to storage. This process goes on continuously and distilled water is made without losing water from the condenser unit.

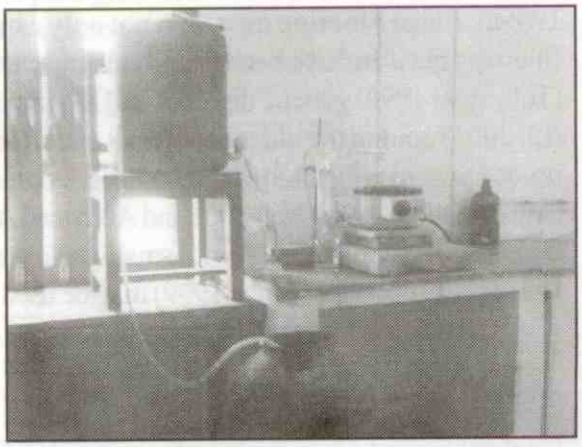


Fig.2. Modified distillation unit

By using this technique, without affecting the quality and speed of distillation, lakhs of liters of water which used to go to drain can be saved and small quantity of about 50 litre used at one time for cooling the condenser unit can be used again and again by recycling it for months together. For a routine glass distillation unit with 2-5 litres of flask

and it requires a trifle amount of just Rs. 300 to attach water recycling unit. The technique is so simple that any user can install it with the existing distillation unit. Such water condenser water recycling device can also be attached to other plants/units such as distilleries, pharmaceutical industries etc. where water is left in drain pipes after cooling the condenser unit.

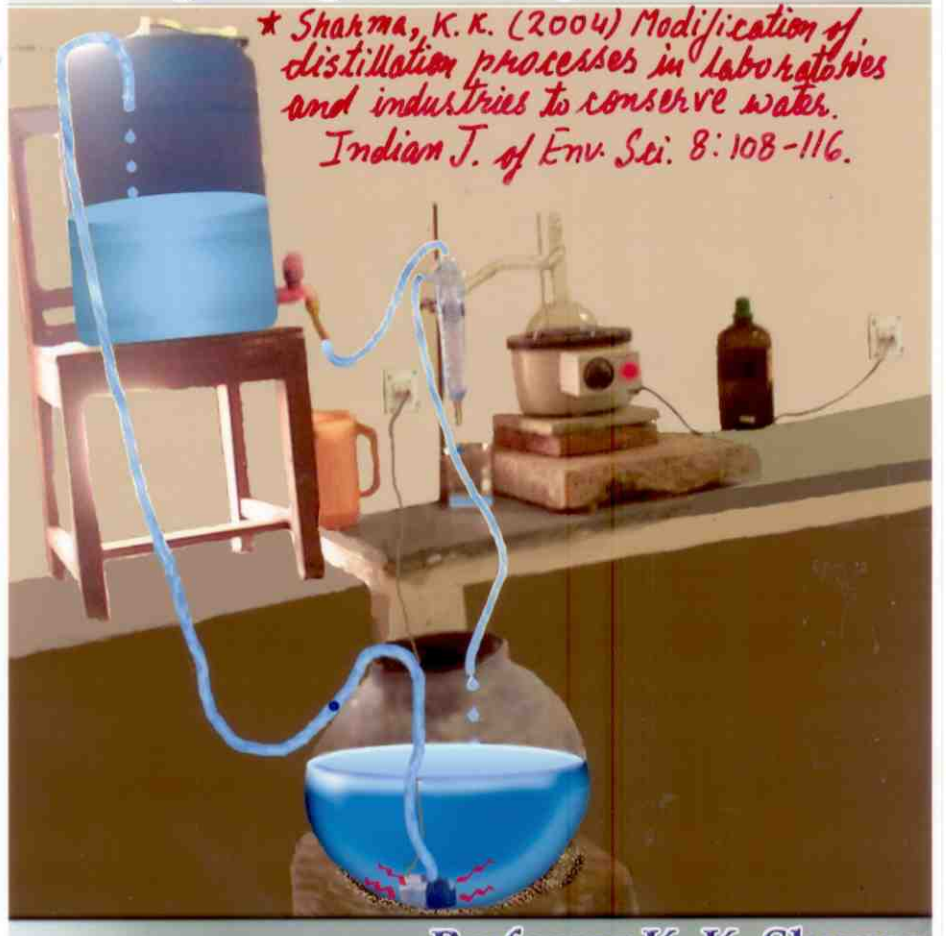
Advantages of condenser water recycling technique

The first and most advantageous aspect of this technique is to prevent waste of a precious natural resource particularly in those places where natural water supply is going down every year and drinking water is not available to meet out the supply of human beings. The second advantage is that user is not dependent on tap water supply for cooling in condenser unit as in many laboratories particularly during summers tap water supply may not be available regularly and if water stops going to condenser tube through the tap it may over heat the condenser unit and can damage it. Third advantage is that, during summers, tap water coming from the regular supply from overhead tank is very hot and it fails to cause effective cooling in condenser tube. This reduces speed of distillation. Since water collected in earthen pot place on moist soil filled in cement container, gets cooled before it is recycle to the condenser unit, the speed of condensation is enhanced even in summer months. After attachment of recycling unit with condenser tube it is not needed to prepare distilled water near wash basin/sink or drain pipe. The modified distillation apparatus can be placed in any room without tap water supply or sink/wash basin or drainpipe. Normally submersible motor is switched on manually to lift water to the reservoir tank, once water is filled in the collecting earthen pot about 3/4th of its capacity. But this can be further automated by inserting a sensor connected with a circuit, which automatically switched on motor when water is filled to a definite level in the collecting earthen pot. The user can select any one of the options to lift water through the submersible motor.

Due to uncontrolled use and removal of ground water and insufficient rains in many parts of world water is becoming day by day as an important natural resources. In such a situation now we cannot afford to wastewater in processes like cooling condenser units and leaving water into drain pipe after that. If this technique of recycling water in condenser unit during distillation is adopted by all the users we can save gallons of water going waste.

A low cost automated recycling distillation technique

Save gallons of water and give better results



* Sharma, K. K. (2004) Modification of distillation processes in laboratories and industries to conserve water. Indian J. of Env. Sci. 8: 108-116.

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