Save water in water distillation systems in laboratories

Munnalal *et al.*[1] seem to be overly concerned with what they call 'the efficiency of the condensing unit', and also with the quantity of water 'flowing down the drain', which they estimate to be '800–1000 litres for every 10 litres of distilled water'. This estimate itself could be wrong for at least two reasons. First, the standard practice for water distillation in laboratories is to maintain just enough water flowing through the condenser to keep the distillate as hot as possible without going off as steam: the high temperature of the distillate results in better quality of the distilled water, especially because there is less of dissolved gases. This practice does not lead to any significant lowering of the efficiency of condensation. Second, part of the hot water flowing out of the condenser is usually fed back into the distillation vessel through a constant-level device built into the vessel: this practice saves energy (electricity or gas) needed for boiling the water. If one chooses, water overflowing from the constant level device can always be collected and reused. Therefore, there is little unnecessary wastage of water. The 'perforated disk' contraption designed by the authors would actually result in wastage of energy. One should be more concerned about this wastage than water going down the drain.

It may be pointed out that de-ionized water can usually serve as a substitute or even as a better option than 'distilled' water in many laboratory procedures. Even tap water will do for many purposes. Using distilled water when it is not needed is similar to using 'Whatman No: 42' filter paper where 'Whatman No: 1' or even a blotting paper is adequate, or using 'analytical grade' sucrose for sweetening your tea. The scientists have to use their knowledge, discretion and sense of responsibility.

1. Munnalal *et al.*, *Curr. Sci.*, 2008, **95**, 438.

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Response:

Our estimate of the tap water that flows through the drain in most commonly used distillation units (glass or steel distillation units) is based on actual measurements on several such units in different laboratories/departments of our university. Very few laboratories actually control the tap water precisely to the minimal level required. However, even in these cases, the water flowing through to the drain in about 8 h of operation would still be at least 500 l.

Most of the distillation units do not have a provision for the water flowing out of the condenser to feed the boiling water container. Even if it does, only a small part is actually reused with the rest flowing out to the drain and thus wasted.

The only additional recurring energy (less than 50 W) used in the 'contraption' described by us is that required to run the water circulating pump. We believe that saving 500 l of water from going down the drain is more sensible than not using this little extra energy!

We agree that de-ionized water can be a good substitute for distilled water in some, but not in all, cases. Tap water can be used only for routine washing. However, a more stringent washing of glassware, etc. needs final rinses with distilled water to get rid of the contaminants that are invariably present in tap water. Preparation of a solution even for school or UG or PG classes requires pure or distilled water, if the students have to be properly trained. Further, deionizers involve their own recurring costs and to prolong their lives, distilled water is often preferred to be used in deionizing units in laboratories.

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Sanakanika inscription and the summer solstice

This refers to Chandra Hari's historical note[1] on the subject regarding the passage way at Udayagiri.

The authors of the earlier historical note[2] are right in their observation that the direction of the rising sun at the place of lat. 23°31′N on the day of summer solstice is 25°56′, the sun's azimuth being about 64°.064855. The Sanakanika inscription mentions its lunar calendrical date as *Ashadha shukla ekadashi* of the regnal year 80. Sharan and Balasubramaniam mention this date as equivalent to 26 June 402 AD.

Chandra Hari's conclusion that the date 26 June 402 falls in the month of *Sravana* and not *Ashadha* is incorrect! In fact, in table 1, under the 'Remarks' column, the author takes the dates of three successive fullmoon days, viz. 402/05/03, 402/06/02 and 402/07/01 as the middle of the lunar months *Vaishakha*, *Ashadha* and *Sravana*. In the process, he has skipped the *Jyeshtha* month between *Vaishakha* and *Ashadha*. In fact, the year 402 AD had neither an *adhika masa* nor a *kshya masa* (i.e. no intercalary months). Thus, the date 402/06/02 corresponds to the fullmoon day in the lunar month of *Jyeshtha*. On the other hand, 402/07/01 was the fullmoon day of *Ashadha* and not of *Sravana*, contrary to Chandra Hari's contention. But, the author's argument that 26 June 402 was a *dashami* (tenth day of the bright fortnight) and that the next day, i.e. 27 June was an *ekadashi* is correct. However, apparently the author's computations are based on modern formulae, while during the period about 16 centuries ago, some ancient traditional astronomical system (pre-Aryabhatan) was in vogue. The parameters