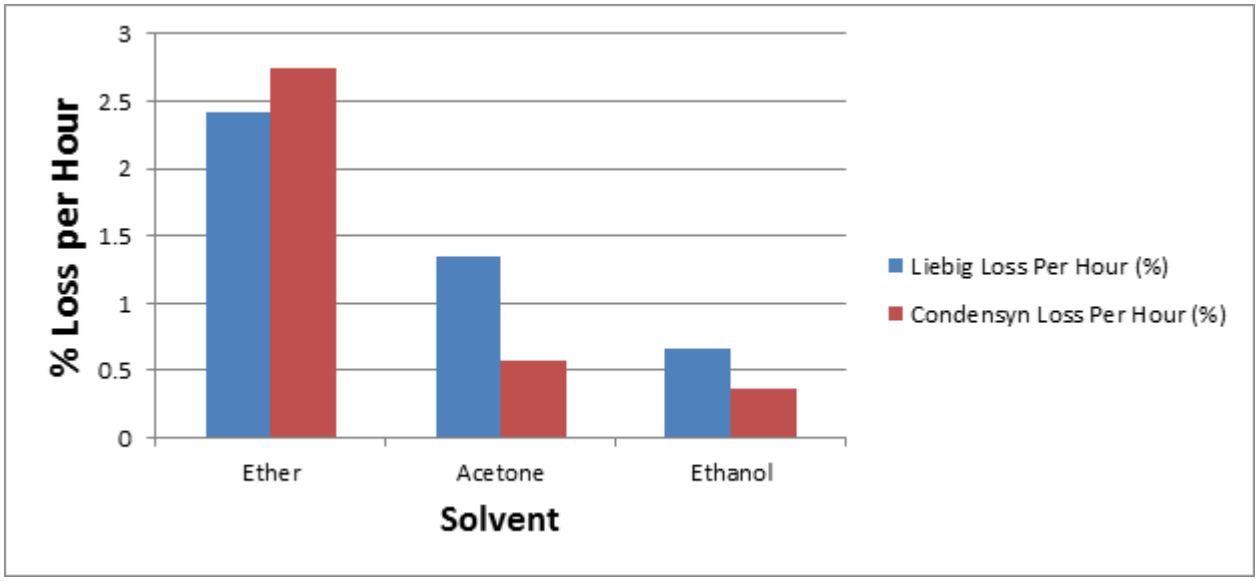
We have tested the Condensyn waterless condenser unit in our laboratories and evaluated it under three main headings: Performance, Water Savings Potential, and Flood Prevention.**

1. Performance

Firstly a look at performance versus a standard water-consuming Liebig condenser:

Solvent	Boiling Point ('C)	Block Temperature ('C)	Liebig Loss Per Hour (%)	Condensyn Loss Per Hour (%)
Ether	34.6	56.0	2.41	2.75
Acetone	56.0	80.0	1.34	0.57
Ethanol	78.4	115.0	0.66	0.36



As can be seen above, the Condensyn performance is on-par when using the lowest boiling point solvent: ether. With the higher boiling point solvents; acetone and ethanol, the Condensyn lost approximately half of the volume compared to the water-consuming Liebig condensers. This study proves that these are ideal for use across a range of commonly used solvents in the under-graduate and post-graduate laboratories.

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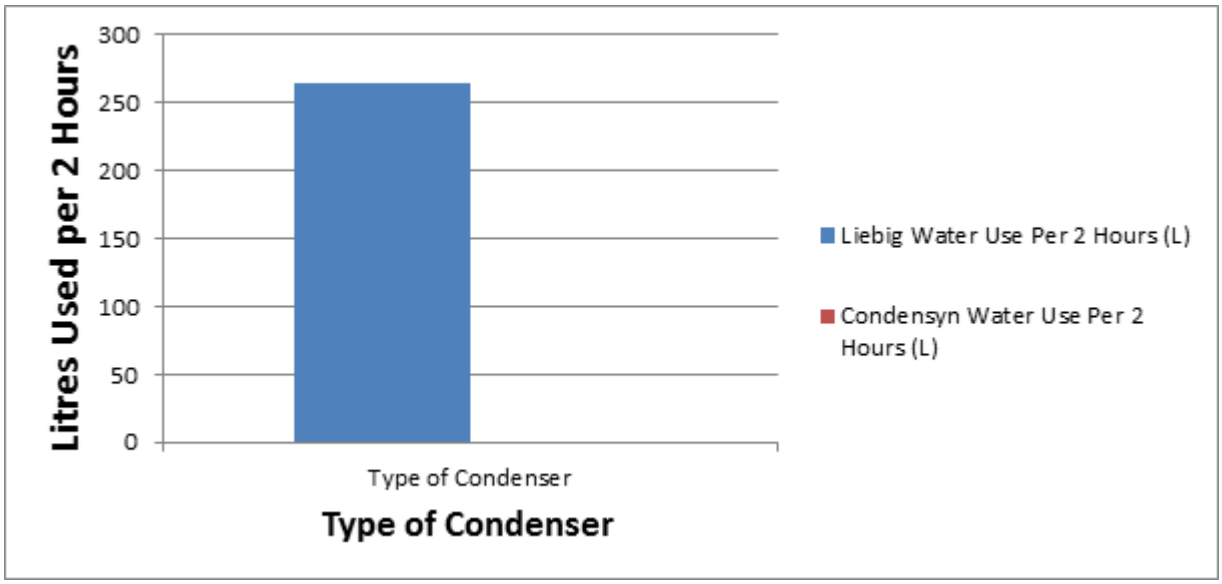
2. Water Savings

Below is an analysis of the water saving potential of switching TU Dublin – Tallaght Campus over to the waterless Condensyn units.

Type of Condenser	Liebig Water Use Per 2 Hours (L)	Condensyn Water Use Per 2 Hours (L)
Type of Condenser	264	0



The water use of the standard Liebig condenser was measured at 2.2 L/min at a minimally low rate of water flow. Over the course of an under-graduate laboratory session, a condenser would typically be used for 2 hours. This results in a total water consumption figure of at least 264 L per student pair, with each lab session catering for approximately 10 groups, and using approximately 2,640 L of water with a standard Liebig condenser unit. There are even greater potential water-savings to be obtained in the post-graduate research lab, with reports of certain reactions taking 100 hours to reach completion. A single 100 hour reaction alone would result in the use of 13,200 L of water using the traditional condenser. It is predicted that these condensers will save 420,000 L of water in the under-graduate labs per annum, which equates to €970 of savings for TU Dublin – Tallaght Campus at current rates, and which will be increasing to €1,430 under Irish Water proposals.

3. Flood Prevention

The problem of flooding is a particularly large concern in the synthetic chemistry labs at both under-graduate and post-graduate levels. Over the past 5 years there has been numerous lab flooding incidents from the use of Liebig condensers. This is due to the uneven water pressures that are common in the Tallaght area. There have been at least 7 incidents of fume hoods flooding, and more seriously 3 incidents of the fume hood floods spilling out onto the floor of the lab. There was 1 serious incident where the flooding from this lab reached the electrochemistry lab directly below. This incident caused minor damage to the lab, however, if the leak was caught any later there would have been extensive damage to the very expensive and specialised equipment housed in that lab. The use of these waterless Condensyn condensers would prevent major losses due to building and equipment flood damage.

Conclusions

These waterless Condensyn units will result in significant environmental benefits through reduced water consumption, cost savings from displacing the use of water and eliminate potential damage due to water leaks from standard Liebig condensers. By using the Condensyn units in the under-graduate teaching labs, the payback period for the higher in the upfront cost difference would be recouped in under three years, with water savings alone.

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****** The scientific evaluation was run in conjunction with **Lennox Laboratory Supplies (www.lennox.ie)** – official Asynt distributor for Ireland.