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**How do astronauts on the space station get water?**

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Koichi Wakata floats in front of the water recovery system in node 3 of the International Space Station. “Here on board the ISS, we turn yesterday’s coffee into tomorrow’s coffee”, he grins as he sips from a reflective drinking water pouch. [5] Mr. Wakata, like the other astronauts aboard the space station, is a pioneer in humanity’s self-sustainability. Water is one of the most important substances to all life on Earth, without it we would die within just a few days. How then can astronauts survive in the unforgiving conditions of space? Hi I’m Buckley Brown, an IST student here at Penn State Brandywine. Today I will be answering the question: how do astronauts on the space station get water? The answer may surprise you as much as it spoils your appetite.

The water recovery system (WRS) is the saving grace for the astronauts aboard ISS. Working in conjunction with the stations oxygen generators, the WRS helps to maintain a habitable environment inside the station.[2] Storage space is limited onboard the space station, there isn’t a single item that does not in some way contribute to the success of the stations various scientific objectives. Everything must be accounted for, from a small photograph of home to one of the stations most important assets: water. Water however, is heavy. To transport and store the necessary quantity of water on the station would cost a fortune and would sacrifice precious energy and storage space.[9] Instead what scientists decided to do was store only a small quantity of water on the station and implement a system to reuse that water over and over again. The water reclamation system currently in use utilizes a process initially developed in the early twentieth century by French Chemist Paul Sabatier. An article published by NASA in 2011 details the inner workings of the Sabatier system explaining, “...this process uses a catalyst that reacts with carbon dioxide and hydrogen - both byproducts of current life-support systems onboard the space station - to produce water and methane.” [1] As a direct consequence of the WRS’ implementation in 2008, the station lowered its dependency on flown-in water and consumables by about 6.8 tons per year.[10]

The water reclamation system on board the space station begins by taking in waste liquid from the station’s toilet facilities. The WRS makes use of a rotating distillation chamber to remove unwanted waste while compensating for the lack of gravity.[5]  From there, the water passes through the water processor assembly where it is combined with moisture from the stations air conditioning units. In the WPA, contaminants such as hair are removed from the water. [3] Next, the water passes through a series of filters to further eliminate any unwanted impurities. Finally the water is heated once more to kill off any microorganisms that may still be present in the water.[6] The end result is drinking water that meets the highest standards for potable drinking water.[5]

Of course with so much time and energy being put into this water, the astronauts on ISS are sure to make good use of every drop. According to an article published on the NASA.gov website, “Rationing and recycling will be an essential part of daily life on the ISS.” [9] The water we take for granted here on Earth is the same water the scientists on board the space station are treating with utmost care and appreciation.

That concludes this analysis of the water reclamation system on the space station. I thank you all for listening and I hope you learned something new about the incredible technology being developed by NASA and other space agencies. Further information about the WRS can be found in the associated script. Thanks again and have a good day!

*(This audio file was recorded by J Buckley Brown on November 11, 2016)*

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