

BREATHING AND PEEING IN SPACE

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into a funnel attached to a tube, and for male astronauts there's just a tube. Air is sucked through the tube to drag the urine inside so that it doesn't float back out. In this way, liquid waste is easily managed on a spacecraft.

(8) Solid waste is a little trickier. When feces is produced a strong vacuum sucks air and poo into the toilet before it can float anywhere. The feces goes into a storage tank which is exposed to the vacuum of space outside. This exposure kills all the microorganisms in the feces and freeze dries the feces. Freeze drying is a process that uses cold temperatures, like those found in outer space, to freeze water until it sublimates which means the water turns

a solid directly into a gas. This helps dehydrate the feces and shrinks its volume. When enough feces is collected from the crew, the feces is put into an unmanned supply ship which is released from the spacecraft. The supply ship is pulled towards the Earth and ends up travelling at extremely high speeds as it re-enters the Earth's atmosphere. As the particles of air rub against the supply ship like sand paper, the intense friction generated by the rubbing tears apart the ship and its contents until they burn away in the atmosphere. It will look like a streak of light in the night sky and an observer from Earth may mistake it for a shooting star when it's actually just a burning container of poo.

Article Questions

- 1) What does the typical mixture of air on Earth composed of?
It contains 78% nitrogen gas and 21% oxygen gas.(2)
- 2) Why is water needed to provide a spacecraft with oxygen?
The electrolysis of water to produce oxygen gas is the main method of oxygen generation on a spacecraft. (4)
- 3) What are three sources of water for a spacecraft?
 - 1) Supply ships bring water.
 - 2) Exhaled water vapor is collected from the air and condensed.
 - 3) Water is collected from urine. (4)
- 4) Why can't water be used to flush toilets in space?
In space water forms a ball instead of flows because of the lack of gravity. Without the ability to flow, water is not useful for flushing toilets.(6)
- 5) How are urine and feces removed in a zero gravity toilet?
Both are removed through sucking air and these materials away from the astronaut using a powerful vacuum.(7 and 8)
- 6) What is freeze drying and why is this useful for treating solid waste?
Freeze drying exposes the waste to cold conditions which sublimates the water and dehydrates the solid waste. This is useful to kill microorganisms in the waste and to shrink the size of the solid waste for easy storage until it can be removed from the spacecraft.(8)
- 7) Next time when you see a "shooting star" in the night sky, you'll realize it might not be as pretty as you used to think. Why?
The shooting star could be the burning remains of a supply ship full of dehydrated feces from the International Space Station. This is not a "pretty" idea.(8)