



Sweet Pee

Teacher Demonstration

Objective:

This demonstration addresses the recycling of water as part of living and working in space. It illustrates the importance of the need to recycle water. Subsequent discussions can raise the level of awareness on how the Earth's environment recycles animal waste.

Materials:

Simulated Urine

Flat Mountain Dew

H₂O with yellow food colouring

Simulated Biological Active Agent

5-10 raisins

Simulated Mixture of Citric and Carbonic Acid

Clear carbonated soft drink or Soda Water

Two 500 ml Beaker or clear plastic cup

Small glass bottle with lid or film canister

Label: Biological Active Reprocessing Agent"

Label: " Carbonic Citric Acid"

Coffee Filter

Elastic band

Two Small clear sealable containers

Preparation:

1. A few days before the demonstration purchase a can or bottle of Mountain Dew. Open it and let it go flat.
2. Chop the raisins into very small pieces, and store in the small glass bottle. Label the vial with "Biologically Active Re-Processing Agent". For effect you can write an impressive looking number (e.g.NisIAr - B2) on the label.
3. Fill one of the small clear sealable containers with the de-carbonated (flat) Mountain Dew. The correct colour GatorAid also works well.
4. Fill the other small clear sealable container with the soda water or carbonated soft drink.
5. Label the bottle "Citric and Carbonic Acid".
6. In one of the 500ml beakers, place the coffee filter. Put approximately 3/4 of the filter into the beaker with the remaining 1/3 folded over the lip of the beaker. Use the elastic bands to hold the top of the filter in place.

Tips & Suggestions:

Remember that this is a simulation, so that if the audience knows what the actual components of the demonstration really are, the effect will be lost.

As a lead in, talk about what the astronauts can not live without, food, air and water. Then talk about how heavy water is and how much it costs to launch heavy items into space. This leads into the fact that for long missions astronauts will have to recycle water in order to have enough.

In Class Demonstration:

1. Once you have created the foundation by talking about the need for water, the cost to carry and transport fresh water and water recycling pull out the clear plastic container with "urine" in it.
2. Note that for short missions, all the water that is needed for the mission can be taken on the flight. Water can be transported from the Earth's surface to orbit, and all waste, including human waste, liquid and solid, can be brought back as needed. For extended missions, not all the water needed for "one time use" can be taken. Water will have to be recycled. This includes urine. At this point hold up the "urine" in the beaker and state that you will show them how this will be done. Be careful not to state what is in the beaker directly. Let the imagination of the audience carry the demonstration.
3. Place the plastic container with the "biologically active agent and the Citric and Carbonic Acid bottles on the desk or some other observable spot. Beside them place the 2 empty 500 ml beakers.
4. Pour the "urine" into the empty 500ml beaker that does not have the coffee filter in it.
5. State that the process of "purifying" the water in the beaker to a drinkable state requires two distinct steps. The first is the dilution of "this" fluid in the "citric and carbonic acid" - this allows the second step to be more effective. Add the fluid in the citric and carbonic acid bottle to the mixture. If anyone is observant enough to comment that the fluid you are adding looks like 7-UP or Sprite, comment that a major portion of both 7-Up and Sprite are citric and carbonic acid and that they could be used.
6. Next, state that a biologically active agent that converts all the impurities in the "solution", except the color, to harmless materials does the purification. It also removes any odor and any "bad taste".
7. Open the biologically active agent container and dump the agent into the fluid. The combination of the agent to the fluid to be purified will result in active bubbling. You can make the statement that "things seem to be working". State that in normal water purification this process takes some time but that you can speed it up because of the small amount of solution and the large amount of reagent. State that stirring or shaking helps.
8. State that the process will take about 30 minutes, and ask the students to remind you to stir the solution about every 5 minutes, to ensure that the appropriate reactions take place.
9. After the 30 minutes is up, pour the liquid into the beaker containing the coffee filter. Explain that the filter is the final step in removing the impurities.
10. For the best results have an friend or college drink the "urine". Do not tell them what it really is. If a college is unavailable make a few hesitant gestures and drink the mixture. You may decide to inform the students what the liquid really was or not.