

Carolina Biological Supply Company

Clean Up Your Mess! Water Remediation



#carolinaNSTA

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www.carolina.com

Workshop Overview

- **Workshop rules**
- **Standards and learning context**
- **Making a mess: Warm-up activity**
- **Cleaning up your mess: Waste water treatment**
- **Cleaning up other messes**
- **Discussion**
- **Workshop evaluation**



Workshop Rules

Safety

- What actual safety concerns exist?

Water, Water, Everywhere!

- Clear tabletops
- Stow electronic devices

Stations

- Work in groups
- Keep detailed data
- Be ready to discuss

Share, talk, and have fun!



Correlation to Next Generation Science Standards*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<ul style="list-style-type: none">• Developing and using models• Planning and carrying out investigations• Analyzing and interpreting data• Using mathematics and computational thinking	<ul style="list-style-type: none">• LS 2: Ecosystems: Interactions, energy, and dynamics• ESS 3: Earth and human activity• ETS 2: Links among engineering, technology, science, and society	<ul style="list-style-type: none">• Cause and effect: Mechanism and explanation• Scale, proportion, and quantity• Energy and matter: Flows, cycles, and conservation

*Next Generation Science Standards® is a registered trademark of Achieve. Neither Achieve nor the lead states and partners that developed the Next Generation Science Standards were involved in the production of, and do not endorse, these products.

Learning Context



- **Advanced Placement[®] Environmental Science**—Pollution types and human impact
- **High School and Middle School Earth/Environmental Science**—Pollution and human impact
- **High School and Middle School Life Science**—Ecosystems and interactions

Warm-Up Activity

**Starting Waste Water:
What do you think it contains?**

- Water
- Vegetable oil
- Sand
- Glucose

**Water Pollution Quiz:
How dirty will your water get?**



Water Pollution Quiz

What percentage of people worldwide do NOT have access to improved sources of drinking water?

- A. 11% B. 33% C. 55% D. 77%



What percentage of people worldwide do NOT have access to improved sanitation?

- A. 11% B. 33% C. 55% D. 77%



In developing countries, what percentage of sewage is discharged untreated directly into water bodies?

- A. 20% B. 40% C. 60% D. 80%



How much polluted waste (in MT) does industry dump in water every year?

- A. 100–200 MT B. 300–400 MT C. 500–600 MT D. 700–800 MT



What is the most common agricultural chemical contaminant found in groundwater aquifers?

- A. Ammonia B. Nitrate C. Phosphate D. Sulfate



About how many people die each year due to inadequate water supply, sanitation, and hygiene?

- A. 3,500 B. 35,000 C. 350,000 D. 3,500,000



Which ecosystem has suffered the greatest degradation in biodiversity?

- A. Estuaries B. Fresh water C. Oceans D. Salt water marshes



 **Agriculture and runoff**  **Sewage and human waste**  **Industrial waste**



**So...
you
made a
mess!**

What do you think?

**Discuss with your table
mates for **3** minutes and be
ready to share.**

NOW WHAT?

CLEAN UP YOUR MESS!

Activity Overview

Tertiary Waste Water Treatment



Activity: Construct a tertiary waste water treatment apparatus

Analysis: Identify the waste removed at each step of the treatment process



Waste Water Treatment Apparatus

Waste Water Treatment

What do you think will be filtered out?

- Step 1: Physical screen
- Step 2: Sedimentation
- Step 3: Aeration and biological treatment
- Step 4: Secondary sedimentation with a flocculant, alum
- Step 5: Inquiry

Glucose Test Results



Waste Water Treatment Results

What was filtered out?

- Step 1: Physical screen
- Step 2: Sedimentation
- Step 3: Aeration and biological treatment
- Step 4: Secondary sedimentation
- Step 5: Inquiry

Discussion

How can you tell how clean your water is?

How clean do you think your water is?

Which group has the cleanest water?

Workshop Summary

What did you learn?

What do you do in your classroom?

What suggestions or modifications do you have for others?

What we used:

- "Water Pollution Awareness Demonstration," Carolina.com Teacher Resource
- Carolina Investigations® for AP® Environmental Science: Wastewater Treatment Kit (item #181089)



Carolina Offers Free Resources to Support Teachers

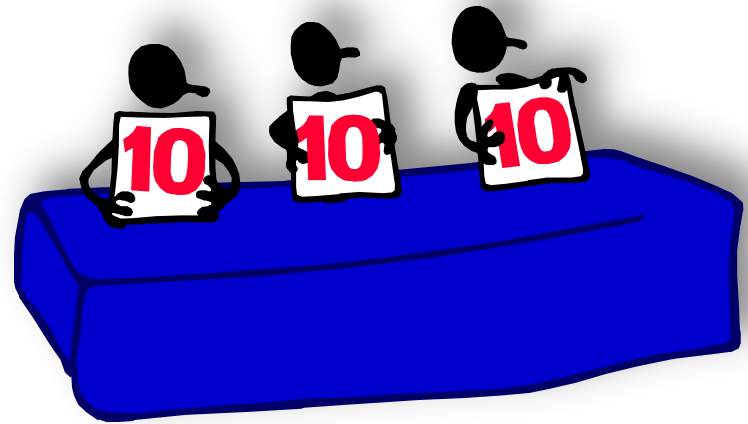


carolina tips®



Evaluations: Share Your Thoughts!

**We are striving to
make our workshops
great!**



**Please evaluate this session and presenter
on a scale from 0 to 10 (10 = best).**

**Please help us reset the room
by gathering your belongings
and exiting between sessions.**

THANK YOU!