



UNIT FRAMEWORK

NAME	GRADE	SUBJECT
Sara Schipper	10-11	Chemistry in the Community

UNIT	Water Availability, Quality, & Purification
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ESSENTIAL QUESTION(S)/OUTCOME(S)
<ul style="list-style-type: none"> • Why are there people without enough water to drink? • Is it possible to provide enough clean water for everybody? • How can different substances be removed from water?

TARGETS
<ul style="list-style-type: none"> • Where is water in storage and what percent is available for human use? • What types of material can be dissolved in water? • Do these materials share common molecular structures and bond types? • How clean can we actually purify polluted water? • Does it matter what pollutant is in the water when comparing the purity and amount recovered? • What is the cost to purify 300 liters of water? • What are the tradeoffs for each purification method?

STANDARDS / TOPICS / SKILLS	
<p>SCIENCE</p> <p>NGSS HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.</p> <p>HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.</p> <p>HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.</p>	<p>TECHNOLOGY</p> <p>2016 ISTE STANDARD 7 Global Collaborator 7d. Students explore local and global issues and use collaborative technologies to work with others to investigate solutions.</p>

<p>ENGINEERING NGSS HS-ETS1-4. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.</p>	<p>MATH CCSS.MATH.CONTENT.6.RP.A.1 Understand ratio concepts and use ratio reasoning to solve problems.</p>
<p>WRITING/SPEAKING CCSS.ELA-LITERACY.RH.9-10.1 Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.</p>	<p>READING CCSS.ELA-LITERACY.WHST.6-8.1.B Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.</p>

VOCABULARY	MATERIALS / RESOURCES / TEXTS
<p>Catchment Ionic bond Covalent bond Hydrocarbon Filtrate Filtration Surfactant Percent recovered Runoff Ground water Solute Solvent Solution Colloid Suspension Polar vs Nonpolar Indirect vs Direct water use Pervious vs Impervious surfaces Adsorb</p>	<ul style="list-style-type: none"> ● Videos: Water Our Thirsty World, How the Earth Changed History Water episode ● Chemistry in the Community text and other readings on water cycle, human use and human impacts ● Computers w/internet: water footprints, water use comparisons, human impacts on the water cycle, bond types ● Lab equipment for building and testing water purification methods

ACTIVITIES
<ol style="list-style-type: none"> 1. Where is our water? <ol style="list-style-type: none"> a. Why does it matter? <ol style="list-style-type: none"> i. Water Our Thirsty World: Watch "Water our Thirsty World" for evidence that our water resources are changing, & go-around protocol ii. Flint water crisis b. Has it changed over time? <ol style="list-style-type: none"> i. CN Water Storage ii. CN Humans and Water c. Personal and hidden water use

- i. [Personal water footprint](#)
 - ii. [Indirect vs Direct water use footprints](#) and [Hidden water use](#) go-around
- 2. How do humans impact the water cycle and water quality?
 - a. Historical societal changes due to water
 - i. How the Earth Changed History Water episode clips (How the Wolves Changed Yellowstone-- river)
 - b. Surfaces and runoff
 - i. [CN Affect of Urbanization](#)
 - ii. [Graphing water flow](#) & comparing with other groups
- 3. What separates different substances from water?
 - a. Large solids & water
 - i. Types of mixtures- solution, colloid, suspension
 - ii. Filtration- Why? explain based on evidence
 - b. Oil & water
 - i. Polar vs nonpolar- hydrocarbons
 - ii. Adsorbtion- Why? explain based on evidence
 - c. Salt & water
 - i. Ionic vs covalent- conduction
 - ii. Distillation- Why? explain based on evidence
 - iii. Ion exchange- types of ions and their effects
- 4. Develop prototype water filters- different groups have different projects, **matrix idea!!!**
 - a. Different sources/pollutants
 - b. Challenge multiple pollutants
- 5. Whiteboard claim, evidence, and reasoning presentations

COMMUNITY PARTNERS (industries, businesses, agencies, colleges, universities)

Community water board
Wastewater treatment plant



STEM ATTRIBUTES

STEM ATTRIBUTES	EVIDENCE / EXAMPLES
Integrates Science, Technology, Engineering, and Math.	Graphing Water Flow Percent Recovery data collections and calculations

Develops communication and literacy skills.	Cornell notes from articles and videos Whiteboard claim, evidence, and reasoning presentations Conclusion writing
Provides authentic, real-world experiences through contextual learning (may include active citizenship).	Flint water crisis Personal and hidden water use
Forms partnerships with business, industry, agencies, and nonprofits (may occur outside the school).	Community water board Wastewater treatment plant
Provides career awareness through postsecondary and career relevant connections.	Community water board Wastewater treatment plant
Fosters problem-solving, critical thinking, and argumentation skills through inquiry and design.	Develop prototype water filters Whiteboard claim, evidence, and reasoning presentations
Includes effective instructional strategies that develop collaboration and teamwork.	Cornell notes, graphing data sets & comparing with other groups Develop prototype water filters Whiteboard claim, evidence, and reasoning presentations Scientific habits of practice
Uses equitable instructional practices that are inclusive to all students regardless of gender, disability, ethnicity, race, language, socioeconomic status, gender identity and sexual orientation.	Whiteboard claim, evidence, and reasoning presentations Accountable talk strategies
Uses standards-based performance/proficiency assessments.	NGSS: HS-PS1-2, HS-PS2-6, and HS-ESS2-5