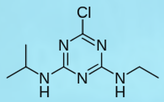
Applications of Electrochemistry

Why transferring electrons is so powerful

Travis Hartberger
McKinley Technology High School | Chemistry & AP® Chemistry

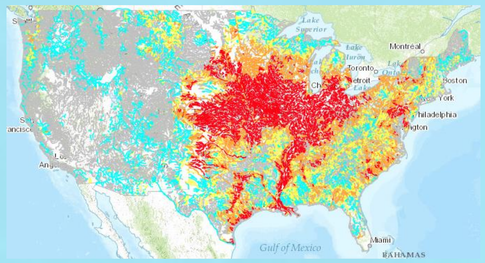
RET is funded by the National Science Foundation, grant # EEC-1404766

What I *did*… *Degradation of Atrazine*



What is atrazine?

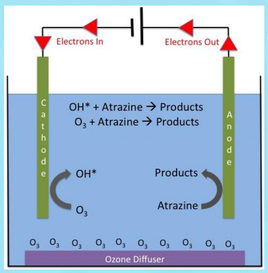
A common pesticide, has notable concentrations in surface water.



Why is it a problem?

Atrazine has been shown to:

- Increase risk of breast cancer in women[1]
- Disrupt hormones and "feminize" animals[1]
- Affect human reproductive system[2]



How can it be removed from water?

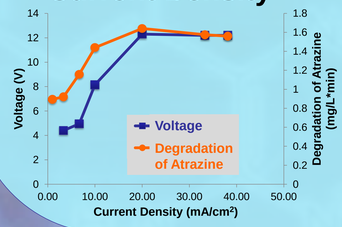
Electrolysis: oxidize to mineralization at the anode (-) electrode

Ozonation: oxidize to mineralization using O_3 (strong, specific oxidant)

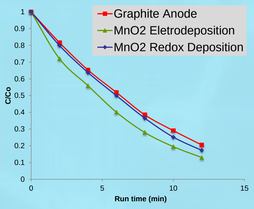
Synergism: Combining the processes is more than doubly efficient!

What are the optimal conditions?

Current Density

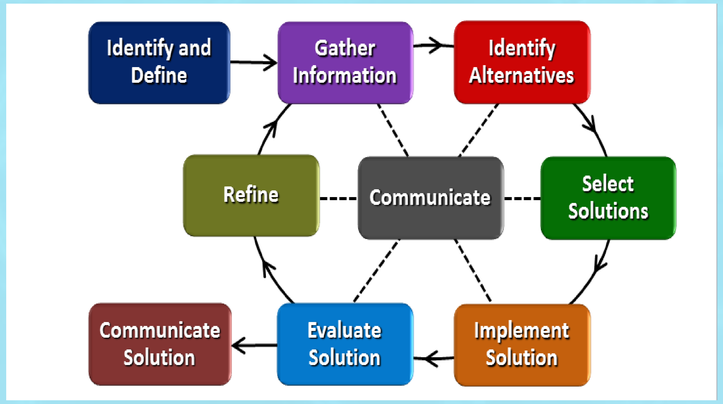


Catalysis

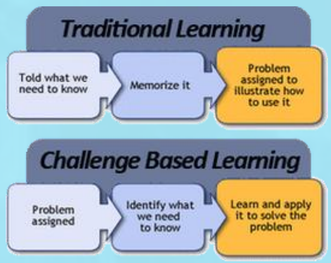


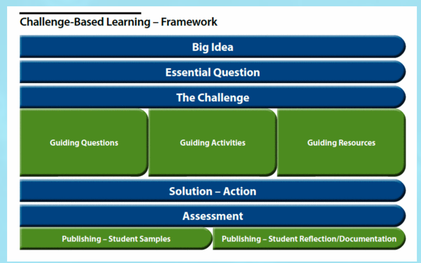
What *YOU* will *DO*…

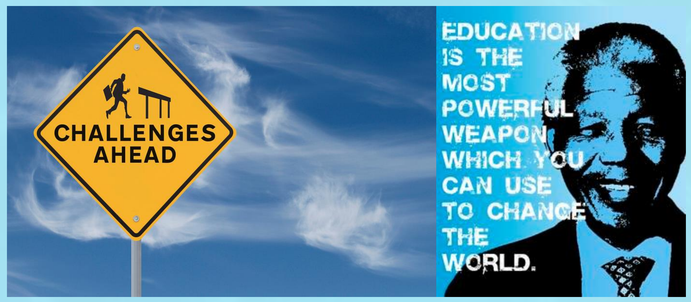
The Engineering Design Process (EDP)



Challenge-based Learning (CBL)



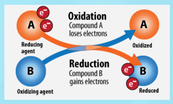




If we teach today's students as we taught yesterday's, we rob them of tomorrow
- John Dewey -

What *YOU* should *THINK* about…

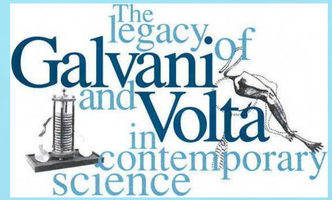
What does the *transfer* of *electrons look* like?



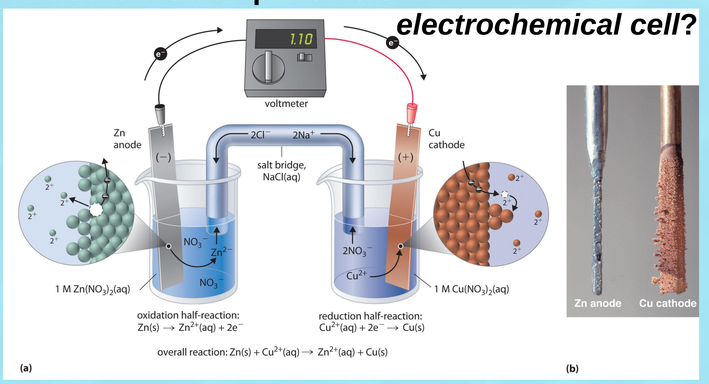
What chemicals can be *oxidized* or *reduced*?

Who was right, Galvani or Volta?

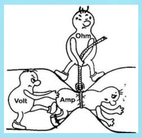
How did they test their hypotheses?



What are the components of an *electrochemical cell*?



Can you predict the *voltage* or *current* that…



…a particular electrochemical cell will produce?