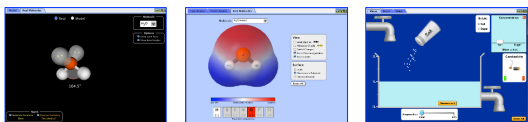


## Using PhET Simulations for High School Chemistry: Free research-based resources on the web



Julia Chamberlain, Trish Loeblein and the PhET Team  
[phet.colorado.edu](http://phet.colorado.edu)

ACS Rocky Mountain Regional Meeting  
 Westminster, CO - October 19, 2012

## Workshop Overview



- Part 1:
  - What are PhET simulations and who creates them?
  - Explore the simulations
- Part 2
  - Plan for use in your school
  - Start designing a lesson

## What is PhET?



Suite of **120** interactive science sims – **38** in chemistry!

Build an Atom



Sugar and Salt Solutions



Build a Molecule



## Your Turn



- How could you use PhET sims with your students?



Build an Atom



Build a Molecule



Sugar and Salt Solutions



## Where is PhET?



Use online  
 or download  
 (~270 MB)

<http://phet.colorado.edu>

## Who is PhET?



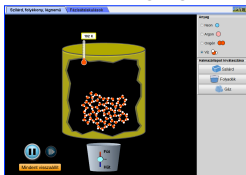
CU Boulder team of scientists, researchers,  
 programmers and educators

## Who uses PhET?



Over **25 million** sims run in 2011, **35%** international!

Sims: 69 languages



Website: 27 languages



**For Translators** > PhET Translation Utility

## How can PhET be *free*?



National Science Foundation



The Hewlett Foundation



The O'Donnell Foundation



The University of Colorado



Carl Wieman & Sarah Gilbert

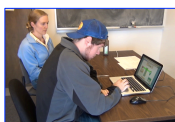


Corporate sponsors, schools, and individuals like you!

## Research Based Design



- Extensive design feedback on each sim
  - Student interviews
  - Classroom studies
- Research on many sims shows what works
  - Students intuitively use controls
  - Students correctly interpret representations



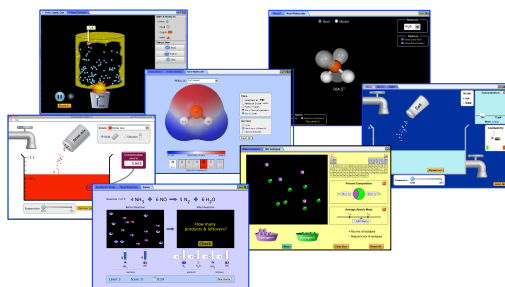
## Explore the Sims



- Use the Planning to Use PhET Sims handout
  - Record your ideas!
- Need help with learning goals?
  - Check the Writing Learning Goals handout



## What Did You Find?



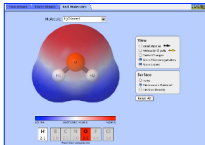
## Meet Back in 5 Minutes



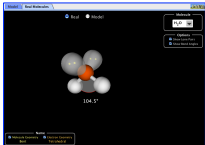
- Part 1:
  - What are PhET simulations and who creates them?
  - Explore the simulations!
- Part 2
  - Plan for use in your school
  - Start designing a lesson

## Chemistry Sims

Molecule Polarity



Molecule Shapes



## Tips for Sim Use

- Start with 5-10 minute open play
- Minimize or eliminate “sim-specific directions”
- Use open, investigative questions
- See PhET Guided Inquiry Strategies handout

Set the acid concentration to 0.010 M...

Explore all the things that affect pH.

## Designing Inquiry Activities

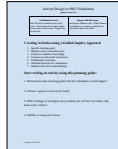
Shake in all the salt and fill the beaker to 2 L. Dip the probes into solution and record conductivity. Reset and repeat for 1.5, 1, and 0.5 L. What do you observe?

Find 3 ways to change solution concentration. How does concentration affect the conductivity of salt solutions? How does it affect conductivity in sugar solutions?

What will students be doing and learning?

## Get to Work!

- Activity Design for PhET Simulations
- Helpful handouts (white pages)
  - Sample lesson plan for Sugar and Salts
  - Ideas for Activities from PhET Teaching Ideas
- Be prepared to share out before we end



## Thanks for your attention!

- Come hear about PhET Research (3:35 today, WB 2)
- Visit us on the web
  - <http://phet.colorado.edu>
  - Contribute a teaching activity
- Contact us
  - [phethelp@colorado.edu](mailto:phethelp@colorado.edu)
  - Suggest new sim topics
  - Report bugs
- Keep in touch!



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