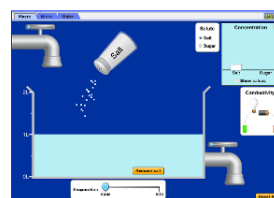
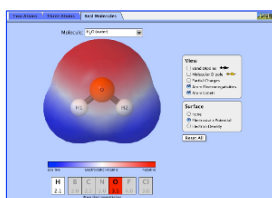
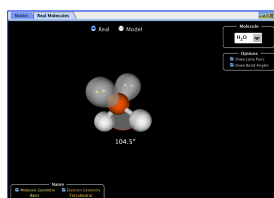


## Using PhET Simulations for Chemistry Inquiry:

Free research-based resources on the web



Julia Chamberlain

and the PhET Team at the  
University of Colorado Boulder

[phet.colorado.edu](http://phet.colorado.edu)

Biennial Conference on Chemical Education, August 1, 2012

## How Many People Here...

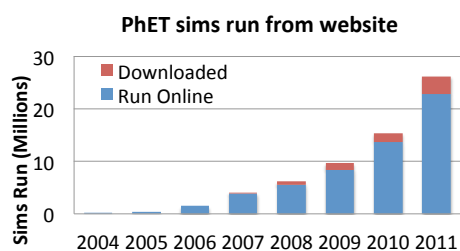


- Work in a college education environment?
- Work in K-12 education?
- Are new to PhET?
- Have used PhET in their teaching?

## Overview



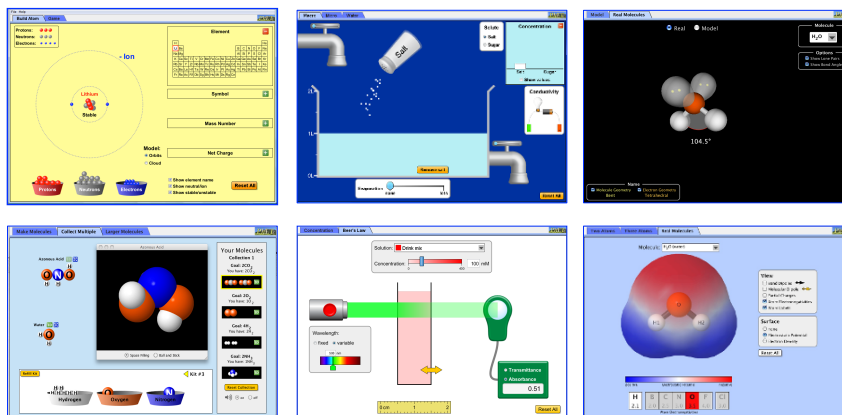
- New Chemistry Sims
  - Designed and researched to support productive inquiry
- Activities on the web for you to use – right away!
- PhET is *free* and here to stay
  - Growing user base
  - Funding for chemistry



## What is PhET?



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



## Where is PhET?



Over 75 million simulations delivered

Interactive Simulations  
UNIVERSITY OF COLORADO AT BOULDER

Interactive Science Simulations

Fun, interactive, research-based simulations of physical phenomena from the PhET™ project at the University of Colorado.

Play with sims...>

Recipient of The Tech Award 2011  
honoring technology benefiting humanity

Applied Materials presents  
The Tech Awards

How to Run Simulations | For Teachers | About | PhET is supported by...

On Line | Full Installation | One at a Time | Troubleshooting | FAQs | Browse Activities | Contribute Activities | Workshops / Materials | Translate simulations | Translate the website | What's New? | About PhET | Contact Us | Donate

English | العربية | 繁体中文 | 正體中文 | Dansk | Engels | Eesti | Suomi | Français | Galego | Georgian | Eλληνικά | Magyar | Bahasa Indonesia | Italiano | 한국어 | كوردی | Македонски | العربية | Português | Português do Brasil | Română | Српски | Español | (Parsi) | Tigrinya | Tigrinya

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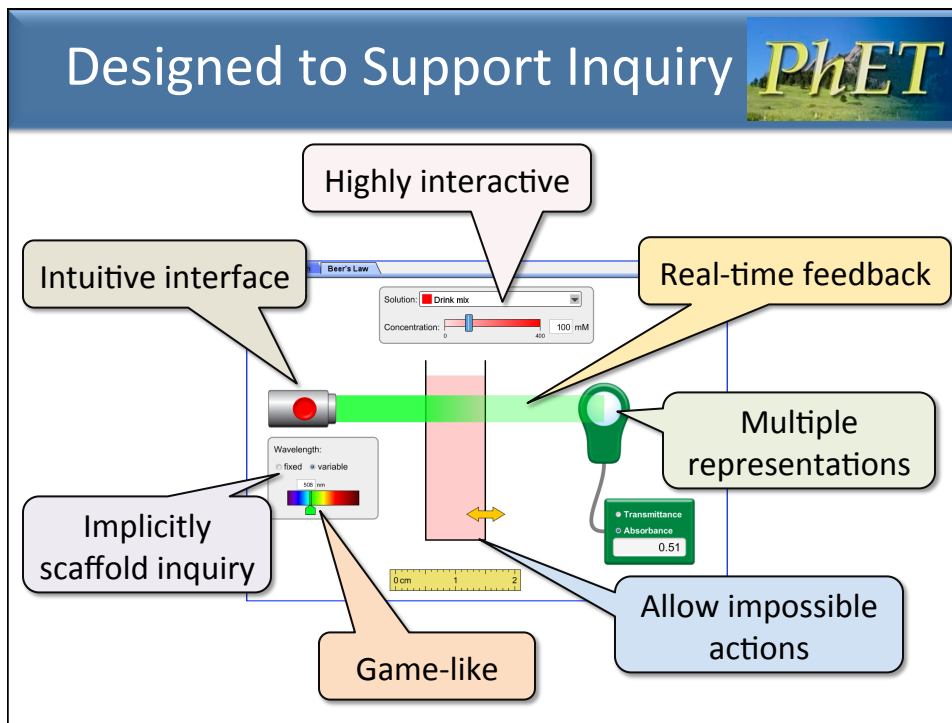
Use online  
or download  
(~270 MB)

<http://phet.colorado.edu>

## Free and Easy to Access

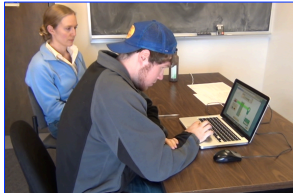



- Pick and choose which sims to use
  - Customize to your environment and goals
- Search the activity database
  - Over 700 activities!
  - Creative Commons open-use license
- Translated in over 69 languages
  - 34% of use is international
  - Resource for English Second Language students



## Research Based Design *PhET*

- 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



## Flexible Use



- Before-class assignment
- In-class activity



Context and activity a

## Activity Design

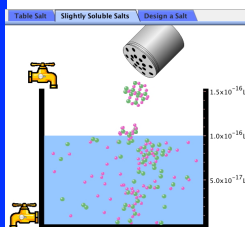


### Salts and Solubility

## Designing Inquiry Activities



Add 100 silver bromide pairs to the water. How many silver and bromide ions dissolve in the water? Repeat this for all salts.



Investigate different salts. What features do salts have in common, and how do salts differ from each other?

What will students be doing and learning?

## Research Based Inquiry Strategies



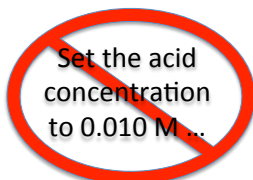
- ✓ Specific learning goals
- ✓ Students reason and make sense
- ✓ Connect to students' knowledge & experiences
- ✓ Collaborative activities
- ✓ Minimal directions
- ✓ Students self-check understanding

Check out [phet.colorado.edu](http://phet.colorado.edu) for more [PhET Advice for Inquiry](#)

## Tips for Productive Inquiry



- Start with 5-10 minute open play
  - Establish student ownership of the sim
- Minimize or eliminate “sim-specific directions”
- Use open, investigative questions



## How can PhET be *free*?



National Science Foundation



The Hewlett Foundation

THE WILLIAM AND FLORA HEWLETT FOUNDATION

The O'Donnell Foundation

O'Donnell Foundation  
*Devoted to Excellence in Education*

The University of Colorado



Carl Wieman & Sarah Gilbert



Corporate sponsors, schools, and individuals like you!

# Thanks for Your Attention!



- <http://phet.colorado.edu>
  - Watch for new sims
  - Contribute a teaching activity
- Contact us
  - [phethelp@colorado.edu](mailto:phethelp@colorado.edu)
  - Suggest new sim topics
  - Report bugs
- Keep in touch!

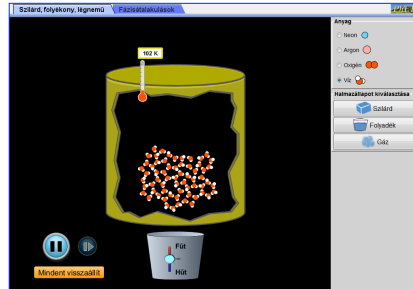
Join us on | Follow us on | Read our blog | Subscribe to our newsletter

# Who uses PhET?



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

Sims: 68 languages




Website: 26 languages



**For Translators > PhET Translation Utility**

# Broad Objectives



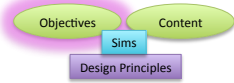
Accessible, Understandable, and Fun

Connections to Everyday Life

Conceptual Learning


Engage in Exploration

Sense of Ownership

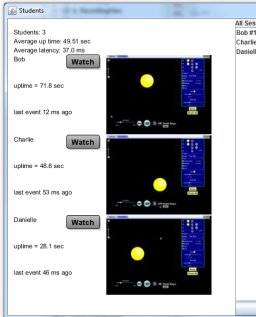


Different designs achieve different objectives

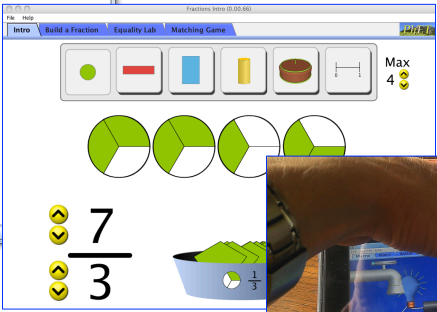
# What's Next for PhET?



### Sim Sharing



### New Sims



### Sims on Tablets

