

# pH Scale

**Talk to a Teacher**

**<http://spoken-tutorial.org>**

**National Mission on Education through ICT**

**<http://sakshat.ac.in>**

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# Learning Objectives



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# Learning Objectives

**We will learn,**



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# Learning Objectives

**We will learn,**

- ▶ **How to use interactive PhET simulation, pH scale**



# Pre-requisites



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# Pre-requisites

- ▶ **Learners should be familiar with topics in high school science**



# System Requirement



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# System Requirement

- ▶ **Ubuntu Linux OS v 14.04**



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- ▶ **Ubuntu Linux OS v 14.04**
- ▶ **Java v 1.7.0**



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- ▶ **Ubuntu Linux OS v 14.04**
- ▶ **Java v 1.7.0**
- ▶ **Firefox web browser v 53.02.2**



# Learning Goals



# Learning Goals

**Using this simulation we will learn to**



# Learning Goals

Using this simulation we will learn to

- ▶ Determine whether a given solution is an acid or a base



# Learning Goals

Using this simulation we will learn to

- ▶ Determine whether a given solution is an acid or a base
- ▶ Arrange acids and bases according to their strength



# Learning Goals

Using this simulation we will learn to

- ▶ Determine whether a given solution is an acid or a base
- ▶ Arrange acids and bases according to their strength
- ▶ Determine the concentration of  $OH^-$ ,  $H_3O^+$  and  $H_2O$  at a given pH



# Learning Goals





# Learning Goals

**Using this simulation we will learn about,**



# Learning Goals

Using this simulation we will learn about,

- ▶ pH of a solution



# Learning Goals

Using this simulation we will learn about,

- ▶ pH of a solution
- ▶ Effect of dilution on pH of solution



# Learning Goals

Using this simulation we will learn about,

- ▶ pH of a solution
- ▶ Effect of dilution on pH of solution
- ▶ **Logarithmic and Linear scale**



# pH scale



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# pH scale

- ▶ **Numeric scale used to specify the acidity or basicity of an aqueous solution**



# pH scale

- ▶ **Numeric scale used to specify the acidity or basicity of an aqueous solution**
- ▶ **pH is a measure of hydrogen ion concentration in mol/L**



# Formula for pH calculation





# Formula for pH calculation

- ▶ pH is negative logarithm to base 10 of hydrogen ion concentration



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# Formula for pH calculation

- ▶ pH is negative logarithm to base 10 of hydrogen ion concentration
- ▶  $pH = -\log[H^+]$



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# pH for Acids, Bases and Neutral Solutions



# pH for Acids, Bases and Neutral Solutions

- ▶ For acidic solutions,  $pH < 7$



# pH for Acids, Bases and Neutral Solutions

- ▶ For acidic solutions,  $pH < 7$
- ▶ For basic solutions,  $pH > 7$



# pH for Acids, Bases and Neutral Solutions

- ▶ For acidic solutions,  $pH < 7$
- ▶ For basic solutions,  $pH > 7$
- ▶ For neutral solutions,  $pH = 7$



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# Link for PhET simulation



# Link for PhET simulation

<http://phet.colorado.edu>





# pH of acids and bases



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# pH of acids and bases

- ▶ According to the above pH values the order is as follows  
*Hand soap > Blood > Orange Juice > Battery Acid*



# Assignment



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# Assignment

**As an assignment,**

- 1. Check the pH of each liquid**
- 2. Arrange the liquids according to the pH range**



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# Assignment



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# Assignment

As an assignment,

1. Measure the pH of Blood sample
2. Observe the change in Molecule Count and  $H_3O^+ / OH^-$  ratio after dilution



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# Assignment



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# Assignment

**As an assignment,**

- 1. Make solutions of pH 7.0 and 9.0**
- 2. Observe and compare the change in molecules**





# Summary



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# Summary

**We have learnt about,**



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# Summary

**We have learnt about,**

- ▶ **Interactive PhET simulation, pH Scale**



# Summary I

- ▶ Determine whether a given solution is an acid or a base
- ▶ Arrange acids and bases according to their strength
- ▶ Determine the concentration of  $H_3O^+$ ,  $OH^-$  and  $H_2O$  at a given pH



# Summary II

- ▶ pH of a solution
- ▶ Effect of dilution on pH of solution
- ▶ Logarithmic and Linear scale



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# About the Spoken Tutorial Project

- ▶ Watch the video available at [http://spoken-tutorial.org/What\\_is\\_a\\_Spoken\\_Tutorial](http://spoken-tutorial.org/What_is_a_Spoken_Tutorial)
- ▶ It summarises the Spoken Tutorial project



# About the Spoken Tutorial Project

- ▶ Watch the video available at [http://spoken-tutorial.org/What\\_is\\_a\\_Spoken\\_Tutorial](http://spoken-tutorial.org/What_is_a_Spoken_Tutorial)
- ▶ It summarises the Spoken Tutorial project
- ▶ If you do not have good bandwidth, you can download and watch it



# Spoken Tutorial Workshops

## The Spoken Tutorial Project Team

- ▶ Conducts workshops using spoken tutorials
- ▶ Gives certificates to those who pass an online test
- ▶ For more details, please write to [contact@spoken-tutorial.org](mailto:contact@spoken-tutorial.org)





# Forum for specific questions

- ▶ Do you have questions in **THIS Spoken Tutorial?**
- ▶ Please visit  
<http://forums.spoken-tutorial.org>
- ▶ Choose the minute and second where you have the question
- ▶ Explain your question briefly
- ▶ Someone from our team will answer them



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- ▶ This project is partially funded by  
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National Mission on Teachers and  
Teaching**



# Acknowledgements

- ▶ **Spoken Tutorial Project is a part of the Talk to a Teacher project**
- ▶ **It is supported by the National Mission on Education through ICT, MHRD, Government of India**
- ▶ **More information on this Mission is available at**

<http://spoken-tutorial.org/NMEICT-Intro>

