

## Calculating pH

How is pH related to the concentration of hydronium ions?

### Why?

In biology and other science courses pH is introduced as a way to quantify the acidity or basicity of a solution. This property can be measured using a pH probe or with an indicator paper strip that changes color at different pH values. But, what is actually being measured? We know that a pH of 7 is neutral, below 7 is acid, and above 7 is base, but why? What in the solution is the paper strip or probe actually reacting with?

### Model 1 – Ion Concentrations for Acids and Bases

Beaker	Solution	Acidic, Basic or Neutral?	$[\text{H}_3\text{O}^+]$	$[\text{OH}^-]$	$[\text{H}_3\text{O}^+] \times [\text{OH}^-]$
1	0.10 M HCl(aq)	Acidic	$1.0 \times 10^{-1}$ M	$1.0 \times 10^{-13}$ M	$1 \times 10^{-14}$
2	0.0010 M HCl(aq)	Acidic	$1.0 \times 10^{-3}$ M	$1.0 \times 10^{-11}$ M	$1 \times 10^{-14}$
3	0.000010 M HCl(aq)	Acidic	$1.0 \times 10^{-5}$ M	$1.0 \times 10^{-9}$ M	$1 \times 10^{-14}$
4	0.0000010 M HCl(aq)	Acidic	$1.0 \times 10^{-6}$ M	$1.0 \times 10^{-8}$ M	$1 \times 10^{-14}$
5	0.00000010 M HCl(aq)	Neutral	$1.0 \times 10^{-7}$ M	$1.0 \times 10^{-7}$ M	$1 \times 10^{-14}$
6	0.00000010 M NaOH(aq)	Neutral	$1.0 \times 10^{-7}$ M	$1.0 \times 10^{-7}$ M	$1 \times 10^{-14}$
7	0.0000010 M NaOH(aq)	Basic	$1.0 \times 10^{-8}$ M	$1.0 \times 10^{-6}$ M	$1 \times 10^{-14}$
8	0.00010 M NaOH(aq)	Basic	$1.0 \times 10^{-10}$ M	$1.0 \times 10^{-4}$ M	$1 \times 10^{-14}$
9	0.010 M NaOH(aq)	Basic	$1.0 \times 10^{-12}$ M	$1.0 \times 10^{-2}$ M	$1 \times 10^{-14}$
10	0.10 M NaOH(aq)	Basic	$1.0 \times 10^{-13}$ M	$1.0 \times 10^{-1}$ M	$1 \times 10^{-14}$

1. What does the symbol  $[\text{H}_3\text{O}^+]$  in Model 1 indicate?

*The molar concentration of hydronium ion.*

2. In Beaker 2, which ion has a higher concentration, hydronium ion or hydroxide ion?

*Hydronium ion.*

3. Describe how the concentration of hydronium ion was calculated for Beaker 3 in Model 1 from the concentration of the acid.

*Since HCl is a strong acid, all of the molecules ionize in water. Therefore, the  $\text{H}_3\text{O}^+$  concentration is equal to the initial acid concentration in the solution.*

4. Describe how the concentration of hydroxide ion was calculated for Beaker 8 in Model 1 from the concentration of the base.

*Since NaOH is a strong base, it completely dissociates in water. Therefore, the  $\text{OH}^-$  concentration is equal to the initial base concentration in the solution.*

# Pogil Calculating Ph Answers

**Jason Neil**



## Pogil Calculating Ph Answers

**Chemistry 2e** Paul Flowers, Richard Langely, William R. Robinson, Klaus Hellmut Theopold, 2019-02-14 Chemistry 2e is designed to meet the scope and sequence requirements of the two semester general chemistry course. The textbook provides an important opportunity for students to learn the core concepts of chemistry and understand how those concepts apply to their lives and the world around them. The book also includes a number of innovative features including interactive exercises and real world applications designed to enhance student learning. The second edition has been revised to incorporate clearer, more current and more dynamic explanations while maintaining the same organization as the first edition. Substantial improvements have been made in the figures, illustrations and example exercises that support the text narrative. Changes made in Chemistry 2e are described in the preface to help instructors transition to the second edition. *POGIL Activities for High School Chemistry* High School POGIL Initiative, 2012

**Biochemical Calculations** Irwin H. Segel, 1968 Weak acids and based Amino acids and peptides Biochemical energetics Enzyme kinetics Spectrophotometry Isotopes in biochemistry Miscellaneous calculations

**Modern Analytical Chemistry** David Harvey, 2000 This introductory text covers both traditional and contemporary topics relevant to analytical chemistry. Its flexible approach allows instructors to choose their favourite topics of discussion from additional coverage of subjects such as sampling, kinetic method and quality assurance.

**Basic Concepts in Biochemistry: A Student's Survival Guide** Hiram F. Gilbert, 2000 Basic Concepts in Biochemistry has just one goal to review the toughest concepts in biochemistry in an accessible format so your understanding is thorough and complete. **BOOK JACKET**

**Teaching at Its Best** Linda B. Nilson, 2010-04-20 Teaching at Its Best This third edition of the best selling handbook offers faculty at all levels an essential toolbox of hundreds of practical teaching techniques, formats, classroom activities and exercises, all of which can be implemented immediately. This thoroughly revised edition includes the newest portrait of the Millennial student, current research from cognitive psychology, a focus on outcomes, maps the latest legal options on copyright issues and how to best use new technology including wikis, blogs, podcasts, vodcasts and clickers. Entirely new chapters include subjects such as matching teaching methods with learning outcomes, inquiry, guided learning and using visuals to teach, and new sections address Felder and Silverman's Index of Learning Styles, SCALE UP classrooms, multiple true/false test items and much more. Praise for the Third Edition of Teaching at Its Best: Everyone, veterans as well as novices, will profit from reading Teaching at Its Best for it provides both theory and practical suggestions for handling all of the problems one encounters in teaching classes, varying in size, ability and motivation. Wilbert McKeachie, Department of Psychology, University of Michigan, and coauthor McKeachie's Teaching Tips. This new edition of Dr. Nilson's book with its completely updated material and several new topics is an even more powerful collection of ideas and tools than the last. What a great resource, especially for beginning teachers, but also for us.

veterans L Dee Fink author *Creating Significant Learning Experiences* This third edition of *Teaching at Its Best* is successful at weaving the latest research on teaching and learning into what was already a thorough exploration of each topic New information on how we learn how students develop and innovations in instructional strategies complement the solid foundation established in the first two editions Marilla D Svinicki Department of Psychology The University of Texas Austin and coauthor McKeachie's *Teaching Tips* [POGIL Activities for AP Biology](#), 2012-10 **Process Oriented Guided Inquiry Learning (POGIL)** Richard Samuel Moog, 2008 POGIL is a student centered group learning pedagogy based on current learning theory This volume describes POGIL's theoretical basis its implementations in diverse environments and evaluation of student outcomes **AP Chemistry For Dummies** Peter J. Mikulecky, Michelle Rose Gilman, Kate Brutlag, 2008-11-13 A practical and hands on guide for learning the practical science of AP chemistry and preparing for the AP chem exam Gearing up for the AP Chemistry exam AP Chemistry For Dummies is packed with all the resources and help you need to do your very best Focused on the chemistry concepts and problems the College Board wants you to know this AP Chemistry study guide gives you winning test taking tips multiple choice strategies and topic guidelines as well as great advice on optimizing your study time and hitting the top of your game on test day This user friendly guide helps you prepare without perspiration by developing a pre test plan organizing your study time and getting the most out of your AP course You'll get help understanding atomic structure and bonding grasping atomic geometry understanding how colliding particles produce states and so much more To provide students with hands on experience AP chemistry courses include extensive labwork as part of the standard curriculum This is why the book dedicates a chapter to providing a brief review of common laboratory equipment and techniques and another to a complete survey of recommended AP chemistry experiments Two full length practice exams help you build your confidence get comfortable with test formats identify your strengths and weaknesses and focus your studies You'll discover how to Create and follow a pretest plan Understand everything you must know about the exam Develop a multiple choice strategy Figure out displacement combustion and acid base reactions Get familiar with stoichiometry Describe patterns and predict properties Get a handle on organic chemistry nomenclature Know your way around laboratory concepts tasks equipment and safety Analyze laboratory data Use practice exams to maximize your score Additionally you'll have a chance to brush up on the math skills that will help you on the exam learn the critical types of chemistry problems and become familiar with the annoying exceptions to chemistry rules Get your own copy of AP Chemistry For Dummies to build your confidence and test taking know how so you can ace that exam [Analytical Chemistry](#) Juliette Lantz, Renée Cole, The POGIL Project, 2014-08-18 The activities developed by the ANAPOGIL consortium fall into six main categories frequently covered in a quantitative chemistry course Analytical Tools Statistics Equilibrium Chromatography and Separations Electrochemistry and Spectrometry These materials follow the constructivist learning cycle paradigm and use a guided inquiry approach Each activity lists content and process learning goals and includes cues for

team collaboration and self assessment The classroom activities are modular in nature and they are generally intended for use in class periods ranging from 50 75 minutes All activities were reviewed and classroom tested by multiple instructors at a wide variety of institutions

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*ChemQuest - Chemistry* Jason Neil,2014-08-24 This Chemistry text is used under license from Uncommon Science Inc It may be purchased and used only by students of Margaret Connor at Huntington Surrey School

**Principles of Modern Chemistry** David W. Oxtoby,1998-07-01 PRINCIPLES OF MODERN CHEMISTRY has dominated the honors and high mainstream general chemistry courses and is considered the standard for the course The fifth edition is a substantial revision that maintains the rigor of previous editions but reflects the exciting modern developments taking place in chemistry today Authors David W Oxtoby and H P Gillis provide a unique approach to learning chemical principles that emphasizes the total scientific process from observation to application placing general chemistry into a complete perspective for serious minded science and engineering students Chemical principles are illustrated by the use of modern materials comparable to equipment found in the scientific industry Students are therefore exposed to chemistry and its applications beyond the classroom This text is perfect for those instructors who are looking for a more advanced general chemistry textbook

ICOPE 2020 Ryzal Perdana,Gede Eka Putrawan,Sunyono,2021-03-24 We are delighted to introduce the Proceedings of the Second International Conference on Progressive Education ICOPE 2020 hosted by the Faculty of Teacher Training and Education Universitas Lampung Indonesia in the heart of the city Bandar Lampung on 16 and 17 October 2020 Due to the COVID 19 pandemic we took a model of an online organised event via Zoom The theme of the 2nd ICOPE 2020 was Exploring the New Era of Education with various related topics including Science Education Technology and Learning Innovation Social and Humanities Education Education Management Early Childhood Education Primary Education Teacher Professional Development Curriculum and Instructions Assessment and Evaluation and Environmental Education This conference has invited academics researchers teachers practitioners and students worldwide to participate and exchange ideas experiences and research findings in the field of education to make a better more efficient and impactful teaching and learning This conference was attended by 190 participants and 160 presenters Four keynote papers were

delivered at the conference the first two papers were delivered by Prof Emeritus Stephen D Krashen from the University of Southern California the USA and Prof Dr Bujang Rahman M Si from Universitas Lampung Indonesia The second two papers were presented by Prof Dr Habil Andrea Bencsik from the University of Pannonia Hungary and Dr Hisham bin Dzakiria from Universiti Utara Malaysia Malaysia In addition a total of 160 papers were also presented by registered presenters in the parallel sessions of the conference The conference represents the efforts of many individuals Coordination with the steering chairs was essential for the success of the conference We sincerely appreciate their constant support and guidance We would also like to express our gratitude to the organising committee members for putting much effort into ensuring the success of the day to day operation of the conference and the reviewers for their hard work in reviewing submissions We also thank the four invited keynote speakers for sharing their insights Finally the conference would not be possible without the excellent papers contributed by authors We thank all authors for their contributions and participation in the 2nd ICOPE 2020 We strongly believe that the 2nd ICOPE 2020 has provided a good forum for academics researchers teachers practitioners and students to address all aspects of education related issues in the current educational situation We feel honoured to serve the best recent scientific knowledge and development in education and hope that these proceedings will furnish scholars from all over the world with an excellent reference book We also expect that the future ICOPE conference will be more successful and stimulating Finally it was with great pleasure that we had the opportunity to host such a conference

**POGIL Activities for AP\* Chemistry** Flinn Scientific,2014 *Learner-Centered Teaching Activities for Environmental and Sustainability Studies* Loren B. Byrne,2016-03-21 Learner centered teaching is a pedagogical approach that emphasizes the roles of students as participants in and drivers of their own learning Learner centered teaching activities go beyond traditional lecturing by helping students construct their own understanding of information develop skills via hands on engagement and encourage personal reflection through metacognitive tasks In addition learner centered classroom approaches may challenge students preconceived notions and expand their thinking by confronting them with thought provoking statements tasks or scenarios that cause them to pay closer attention and cognitively see a topic from new perspectives Many types of pedagogy fall under the umbrella of learner centered teaching including laboratory work group discussions service and project based learning and student led research among others Unfortunately it is often not possible to use some of these valuable methods in all course situations given constraints of money space instructor expertise class meeting and instructor preparation time and the availability of prepared lesson plans and material Thus a major challenge for many instructors is how to integrate learner centered activities widely into their courses The broad goal of this volume is to help advance environmental education practices that help increase students environmental literacy Having a diverse collection of learner centered teaching activities is especially useful for helping students develop their environmental literacy because such approaches can help them connect more personally with the material thus increasing the chances for altering the affective and behavioral

dimensions of their environmental literacy This volume differentiates itself from others by providing a unique and diverse collection of classroom activities that can help students develop their knowledge skills and personal views about many contemporary environmental and sustainability issues

**Chemistry Education in the ICT Age** Minu Gupta Bhowon, Sabina Jhaumeer-Laulloo, Henri Li Kam Wah, Ponnadurai Ramasami, 2009-07-21 th th The 20 International Conference on Chemical Education 20 ICCE which had rd th Chemistry in the ICT Age as the theme was held from 3 to 8 August 2008 at Le Meridien Hotel Pointe aux Piments in Mauritius With more than 200 participants from 40 countries the conference featured 140 oral and 50 poster presentations th Participants of the 20 ICCE were invited to submit full papers and the latter were subjected to peer review The selected accepted papers are collected in this book of proceedings This book of proceedings encloses 39 presentations covering topics ranging from fundamental to applied chemistry such as Arts and Chemistry Education Biochemistry and Biotechnology Chemical Education for Development Chemistry at Secondary Level Chemistry at Tertiary Level Chemistry Teacher Education Chemistry and Society Chemistry Olympiad Context Oriented Chemistry ICT and Chemistry Education Green Chemistry Micro Scale Chemistry Modern Technologies in Chemistry Education Network for Chemistry and Chemical Engineering Education Public Understanding of Chemistry Research in Chemistry Education and Science Education at Elementary Level We would like to thank those who submitted the full papers and the reviewers for their timely help in assessing the papers for publication th We would also like to pay a special tribute to all the sponsors of the 20 ICCE and in particular the Tertiary Education Commission <http://tec.intnet.mu> and the Organisation for the Prohibition of Chemical Weapons <http://www.opcw.org> for kindly agreeing to fund the publication of these proceedings

*Chemistry 2e* Paul Flowers, Klaus Theopold, Richard Langley, Edward J. Neth, William R. Robinson, 2019-02-14 Chemistry 2e is designed to meet the scope and sequence requirements of the two semester general chemistry course The textbook provides an important opportunity for students to learn the core concepts of chemistry and understand how those concepts apply to their lives and the world around them The book also includes a number of innovative features including interactive exercises and real world applications designed to enhance student learning The second edition has been revised to incorporate clearer more current and more dynamic explanations while maintaining the same organization as the first edition Substantial improvements have been made in the figures illustrations and example exercises that support the text narrative Changes made in Chemistry 2e are described in the preface to help instructors transition to the second edition

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