

POGIL 2 Ions

How are ions made from neutral atoms?

You have learned that not all atoms of an element are the same. Variation in the number of neutrons results in different isotopes of the element. In this activity we will explore another variation that can take place—the loss and gain of electrons. The exchange of electrons between atoms is a very common way for chemical change to take place. We will see it many times throughout the year.

1. Use Diagram 1 on the next page to complete the following table.

	Metal or Nonmetal	Number of protons in the atom	Number of protons in the ion	Number of neutrons in the atom	Number of neutrons in the ion	Number of electrons in the atom	Number of electrons in the ion	Charge on the ion
Lithium	metal	3	3	4	4	3	2	1+
Magnesium	<i>Metal</i>	12	12	12	12	12	10	2+
Aluminum	<i>Metalloid</i>	13	13	14	14	13	10	3+
Fluorine	<i>Non metal</i>	9	9	10	10	9	10	1-
Oxygen	nonmetal	8	8	8	8	8	10	2-
Nitrogen	<i>Non metal</i>	7	7	7	7	7	10	3-

2. Based on the table you completed in Question 1, what distinguishes a neutral atom from an ion?

A neutral atom has the same number of protons and electrons (no charge). An ion has a charge (# of protons does not equal # of electrons).

3. Examine the isotope symbols in Diagram 1.

- a. Where is the ion charge located in the isotope symbol?

Top right corner

- b. Is a charge indicated on the neutral atoms? If yes, where is it located?

No

4. Which subatomic particle carries a positive charge?

Protons are positive

5. Which subatomic particle carries a negative charge?

Electrons are negative

6. Propose a mathematical equation to calculate the charge on an ion from the number of protons and electrons in an ion. Confirm that your equation works using two positive ion examples and two negative ion examples from Diagram 1.

The charge of an ion = # of protons - # of electrons

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**Juliette Lantz, Renée Cole, The POGIL
Project**



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Analytical Chemistry Juliette Lantz, Renée Cole, The POGIL Project, 2014-12-31 An essential guide to inquiry approach instrumental analysis Analytical Chemistry offers an essential guide to inquiry approach instrumental analysis collection The book focuses on more in depth coverage and information about an inquiry approach This authoritative guide reviews the basic principles and techniques Topics covered include method of standard the microscopic view of electrochemistry calculating cell potentials the BerriLambert atomic and molecular absorption processes vibrational modes mass spectra interpretation and much more *Chemical Pedagogy* Keith S Taber, 2024-12-20 How should chemistry be taught in schools colleges and universities Chemical Pedagogy discusses teaching approaches and techniques the reasoning behind them and the evidence for their effectiveness The book surveys a wide range of different pedagogic strategies and tactics that have been recommended to better engage learners and provide more effective chemistry teaching These accounts are supported by an initial introduction to some key ideas and debates about pedagogy the science of teaching Chemical Pedagogy discusses how teaching innovations can be tested to inform research based practice Through this book the author explores the challenges of carrying out valid experimental studies in education and the impediments to generalising study results to diverse teaching and learning contexts As a result the author highlights both the need to read published studies critically and the value of teachers and lecturers testing out recommended innovations in their own classrooms Chemical Pedagogy introduces core principles from research into human cognition and learning to provide a theoretical perspective on how to best teach for engagement and understanding An examination of some of the more contentious debates about pedagogy leads to the advice to seek optimally guided instruction which balances the challenge offered to learners with the level of support provided This provides a framework for discussing a wide range of teaching approaches and techniques that have been recommended to those teaching chemistry across educational levels including both those intended to replace teaching from the front and others that can be built into traditional lecture courses to enhance the learning experience *Ion Solvation* Y. Marcus, 1985 Chemical reactions generally take place in solution and often involve ions The behaviour of ions in solution manifested through ion solvation is therefore of prime interest in chemistry This book considers in depth the phenomenology of ion solvation and the models and interpretations that have been proposed as the physical causes for the observed phenomena It contains a thorough discussion of the statistical thermodynamic background of the solvation process from which a discussion of the actual thermodynamics is developed This in turn serves as a background to the structural and kinetic features of ion solvation **Ions in Solution (1) (sound Recording)**. John Burgess, 1984 **Ionic Processes in Solution** Ronald Wilfrid Gurney, 1962 Complex Ions Arthur Jaques, 2015-07-07 Excerpt from Complex Ions In Aqueous Solutions In compiling this volume the needs and criticism of a large class of students unversed in physical chemistry have been especially kept in view and it is considered that the introduction of some elementary matter such as proofs of formulae

which the advanced reader will not require is by no means out of place In giving an account of the methods in Chapters III VI it was found necessary to introduce examples but these were made as brief as possible in order to avoid confusing these chapters with the later ones which deal with practical investigations where more than one method is generally used at a time The tension experiments in Chapter VIII form a method of investigation in which the examination of different salts shows so little variation that it appeared unnecessary to devote a separate chapter to the method The chief aim of the book is to give some account of the more important experimental work in this subject and no apology is offered for the absence of theories of valency Chapter X contains an account of some results besides the identification of complex compounds which have been arrived at by similar methods and which are likely to form the basis of further experiments About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books Find more at www.forgottenbooks.com This book is a reproduction of an important historical work Forgotten Books uses state of the art technology to digitally reconstruct the work preserving the original format whilst repairing imperfections present in the aged copy In rare cases an imperfection in the original such as a blemish or missing page may be replicated in our edition We do however repair the vast majority of imperfections successfully any imperfections that remain are intentionally left to preserve the state of such historical works

Ions , Ions in Solution and their Solvation Yizhak Marcus, 2015-08-03 The book starts with an exposition of the relevant properties of ions and continues with a description of their solvation in the gas phase The book contains a large amount of factual information in the form of extensive tables of critically examined data and illustrations of the points made throughout It covers the relevant properties of prospective liquid solvents for the ions the process of the transfer of ions from the gas phase into a liquid where they are solvated various aspects of the solutions of the ions such as structural and transport ones and the effects of the ions on the solvent dynamics and structure what happens in cases where the solvent is a mixture selective solvation takes place applications of the concepts expounded previously in fields such as electrochemistry hydrometallurgy separation chemistry biophysics and synthetic methods *Ion Solvation* Yizhak Marcus, 1985 **Solvation of Ions** Anna King, 1967 **Ions, Electrodes, and Membranes** Jiri Koryta, 1988 **Ion Channels** Nikita Gamper, 2013-03-26 Every cell in our bodies contains a great variety and number of permeability pathways for various organic and inorganic ions water metabolites nutrients and signalling molecules Maintenance and precise control of gating within these pathways are fundamental principles of life as these underlie basic cellular functions such as communication contractility and metabolism In *Ion Channels Methods and Protocols* Second Edition experts in the field contribute chapters that focus on the strategies approaches methods and protocols for studying a large family of proteins that form ionic channels in the plasma membrane and intracellular membranes of cells Using practical examples from the cutting edge current research this volume will take a look back at the major methods and approaches that aided the progress toward the current understanding of ion channel function structural design and biological roles The volume also aims to look forward

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Intermediate and Complex Ions, 1919 **Ion the Prize** Leo Sahaya Daphne Antony, 2025 Understanding solid liquid interfacial interactions is essential for controlling chemical reactivity material synthesis and electrochemical behaviour These interfaces play a key role in a wide range of applications from energy conversion and storage to the fabrication of functional materials This thesis examines how ions in solution influence the organization of solvent molecules and the energetics at interfaces both in equilibrium and under applied potential The first part of the thesis focuses on the solution based synthesis of low dimensional perovskite materials particularly butylammonium lead iodide It demonstrates that the oxidation state of the lead precursors Pb²⁺ versus Pb⁴⁺ significantly impacts ion solvent complexation leading to distinct crystallization behaviours and morphologies These findings underscore the importance of precursor chemistry in directing material formation at the molecular level The second part of the thesis applies Electrochemical Atomic Force Microscopy to quantitatively map adhesion forces at electrified interfaces with high spatial resolution By examining various electrolyte compositions and electrode materials the thesis reveals how interfacial forces depend on ion identity surface structure and electrochemical conditions These findings provide insights into the nanoscale organization of the electric double layer and uncover ion specific effects that challenge traditional models of electrochemical interfaces This thesis highlights the active and dynamic interplay of all system components including ions solvents and solid surfaces in shaping interfacial structure chemical pathways and electrochemical behaviour **First Principle Study of Ions in Water and Ionic Liquids** Christian Krekeler, 2008 The Principle of the Specific Interaction of Ions Johannes Nicolaus Brønsted, 1921 **Ions and cell transofrmation** Mary Patricia Sutter Moyer, 1981 **The Ion Channel** E.C. Conley, 1996

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