

Experiment 10

Oxidation-Reduction (Redox) Reactions

Pre-Lab Assignment

Before coming to lab:

- Read the lab thoroughly.
- Answer the pre-lab questions that appear at the end of this lab exercise.

Purpose

A set of oxidation-reduction (redox) reactions will be performed to determine the relative strengths as reducing and oxidizing agents of metals and other ions. An activation series will be devised and used to predict whether a reaction will occur spontaneously or not.

Background

Oxidation-reduction (redox) reactions are a classification of chemical changes that involve the transfer of electrons. An example of a redox reaction is shown in Eqn. 1, when magnesium metal reacts with chlorine gas.



At first glance, the electron exchange is not apparent as electrons are not included in the overall balanced equation. However, electrons are shown when the reaction is split into halves: an oxidized half-reaction and a reduced half-reaction, as in Eqn. 2 and Eqn. 3 respectively.



Notice that in the half-reactions, the electrons are required to balance the charges. Since Mg is becoming more positive, one magnesium atom loses two electrons to become a cation and is said to be **oxidized**. Chlorine is becoming more negative, so one molecule of $\text{Cl}_2(\text{g})$ gains two electrons to become two chloride anions and is said to be **reduced**. Both oxidation and reduction happen simultaneously in a single redox reaction. Overall, Mg is transferring two electrons to chlorine (Fig. 1).

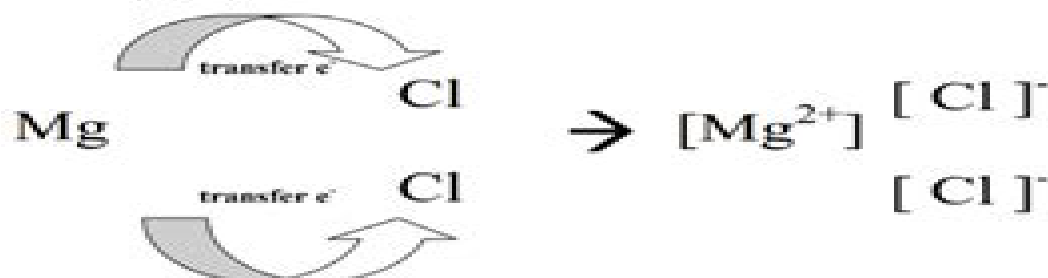


Fig. 1: Redox reaction between Mg(s) and $\text{Cl}_2(\text{g})$ to produce $\text{MgCl}_2(\text{aq})$

Lab Manual Answers Redox Oxidation Reduction Reaction

Phyllis Buell, James Girard



Lab Manual Answers Redox Oxidation Reduction Reaction:

Laboratory Manual for Principles of General Chemistry J. A. Beran, Mark Lassiter, 2022-08-16 Laboratory Manual for Principles of General Chemistry 11th Edition covers two semesters of a general chemistry laboratory program The material focuses on the lab experiences that reinforce the concepts that not all experimental conclusions are the same and depend on identifying an appropriate experimental procedure selecting the proper apparatus employing the proper techniques systematically analyzing and interpreting the data and minimizing inherent variables As a result of good data a scientific and analytical conclusion is made which may or may not be right but is certainly consistent with the data Experiments write textbooks textbooks don't write experiments A student's scientific literacy grows when experiences and observations associated with the scientific method are encountered Further experimentation provides additional cause effect observations leading to an even better understanding of the experiment The 11th edition's experiments are informative and challenging while offering a solid foundation for technique safety and experimental procedure The reporting and analysis of the data and the pre and post lab questions focus on the intuitiveness of the experiment The experiments may accompany any general chemistry textbook and are compiled at the beginning of each curricular unit An Additional Notes column is included in each experiment's Report Sheet to provide a space for recording observations and data during the experiment Continued emphasis on handling data is supported by the Data Analysis section *Green Chemistry Laboratory Manual for General Chemistry* Sally A. Henrie, 2015-03-18 Green chemistry involves designing novel ways to create and synthesize products and implement processes that will eliminate or greatly reduce negative environmental impacts Providing educational laboratory materials that challenge students with the customary topics found in a general chemistry laboratory manual this lab manual enables students to see how green chemistry principles can be applied to real world issues Following a consistent format each lab experiment includes objectives prelab questions and detailed step by step procedures for performing the experiments Additional questions encourage further research about how green chemistry principles compare with traditional more hazardous experimental methods **Environmental Sampling and Analysis** Maria Csuros, 1997-03-24 This manual covers the latest laboratory techniques state of the art instrumentation laboratory safety and quality assurance and quality control requirements In addition to complete coverage of laboratory techniques it also provides an introduction to the inorganic nonmetallic constituents in environmental samples their chemistry and their control by regulations and standards *Environmental Sampling and Analysis Laboratory Manual* is perfect for college and graduate students learning laboratory practices as well as consultants and regulators who make evaluations and quality control decisions Anyone performing laboratory procedures in an environmental lab will appreciate this unique and valuable text **Laboratory Manual** Jo A. Beran, 1990 **EduGorilla's CBSE Class 12th Chemistry Lab Manual | 2024 Edition | A Well Illustrated** EduGorilla Prep Experts, *A Laboratory Manual of Metals and Alloys* S. M. Ashraf, 2008-12-08 This compendium of twenty laboratory

experiments on metals and alloys attempts to provide to students of Science and Engineering an insight about the relationship of the physical specially mechanical properties of metals with grain structures microstructures In almost all the experiments therefore the microstructural investigation is provided Experiments have also been included on the determination of important mechanical and thermal properties and on the aqueous and atmospheric corrosion of metals Theoretical background of each experiment has been dealt with in good detail in order to enable the student to understand the underlying principles and to appreciate the significance of the experiments Information which could not be accommodated given in the text of the experiments has been provided in the form of appendices These include reflection microscopy experimental determination of transition points through cooling curves to get data for plotting phase diagrams and quenching media for tempering of alloys In view of the importance of microstructures for some metals and alloys have also been given Laboratory Manual for Chemistry Fundamentals Phyllis Buell,James Girard,2002-08 Physical Sciences

AP Biology For Dummies Peter J. Mikulecky,Michelle Rose Gilman,Brian Peterson,2008-06-02 Relax The fact that you re even considering taking the AP Biology exam means you re smart hard working and ambitious All you need is to get up to speed on the exam s topics and themes and take a couple of practice tests to get comfortable with its question formats and time limits That s where AP Biology For Dummies comes in This user friendly and completely reliable guide helps you get the most out of any AP biology class and reviews all of the topics emphasized on the test It also provides two full length practice exams complete with detailed answer explanations and scoring guides This powerful prep guide helps you practice and perfect all of the skills you need to get your best possible score And as a special bonus you ll also get a handy primer to help you prepare for the test taking experience Discover how to Figure out what the questions are actually asking Get a firm grip on all exam topics from molecules and cells to ecology and genetics Boost your knowledge of organisms and populations Become equally comfortable with large concepts and nitty gritty details Maximize your score on multiple choice questions Craft clever responses to free essay questions Identify your strengths and weaknesses Use practice tests to adjust you exam taking strategy Supplemented with handy lists of test taking tips must know terminology and more AP Biology For Dummies helps you make exam day a very good day indeed Laboratory Manual for General College Chemistry Jesse Hermon Wood,William T. Smith,1957 *Laboratory Manual in Quantitative Chemical Analysis* , *Chemistry Lab Manual Class XII* | follows the latest CBSE syllabus and other State Board following the CBSE Curriculum. Mr. Rohit Manglik,Mr. Kaushalesh Dwivedi,2022-08-04 With the NEP and expansion of research and knowledge has changed the face of education to a great extent In the Modern times education is not just constricted top the lecture method but also includes a practical knowledge of certain subjects This way of education helps a student to grasp the basic concepts and principles Thus trying to break the stereotype that subjects like Physics Chemistry and Biology means studying lengthy formulas complex structures and handling complicated instruments we are trying to make education easy fun and enjoyable *Laboratory Manual for*

Principles of General Chemistry Jo Allan Beran, 2010-11-01 This new edition of the Beran lab manual emphasizes chemical principles as well as techniques The manual helps students understand the timing and situations for the various techniques The Beran lab manual has long been a market leading lab manual for general chemistry Each experiment is presented with concise objectives a comprehensive list of techniques and detailed lab intros and step by step procedures **Laboratory Manual for Fundamentals of Chemistry 3/E** Jo A. Beran, 1988 *Applied Chemistry | AICTE Prescribed Textbook - English* Anju Rawley, D. V. Saraf, 2021-11-01 This text book o Applied Chemistry is development as per AICTE model curriculum 2018 for compulsory course on Applied Chemistry of first years Diploma Programme in Engineering and Technology Atomic Structure Chemical Bonding Solution Water Engineering Materials Chemistry of fuels Lubricants and Electrochemistry are the five units of this book comprising of both practicals and theory Some salient features of the book l Course Outcomes and Unit Outcomes are written specifically and are mapped with programme Outcomes l Utmost care have been taken to amalgamate the philosophy of outcome based education l The structure of the textbook is comprehensive where in practical exercises are integral part of each unit l The text is presented in a very simple way with illustrations examples tables flow chart self assessment questions and their solutions l Micro projects points issue for the creative inquisitiveness curiosity know more video links case study and summary points are integral part of each unit to facilitate the students to develop the attitude of scientific inquiry investigate the cause and effect relationship systematic scientific logical thinking ability to observe analyse and interpret l To meet the requirement of outcome based education OBE and outcome based assessment OBA criterion referenced testing CRT have been used as an integral part of assessment in each practical l Sample QR codes have been provided in each units on some topics sub topics for supplementary reading and reinforcing the learning **Lab Manual Chemistry Class XII -by Dr. K. N. Sharma, Dr. Subhash Chandra Rastogi, Er. Meera Goyal (SBPD Publications)** Dr. K. N. Sharma, Dr. Subhash Chandra Rastogi, Er. Meera Goyal, 2021-07-03 Highly Useful for Various Engineering and Medical Competitive Examinations *Chemistry Lab Manual* Neena Sinha, R Rangarajan, R P Manchanda, R K Gupta, Rajesh Kumar, Lab Manual **Introduction to Chemistry, Laboratory Manual** T. R. Dickson, 1994-12-23 Teaches chemistry by offering a dynamic provocative and relevant view of the topic and its importance to society and our daily lives Three themes are stressed throughout the text developing chemical thinking and a chemical vision learning problem solving methods and utilizing group work and discussion activities These themes involve and engage the students in their own learning processes they are challenged to be active The presentation of topics has been altered to include a new chapter which introduces the students to scientific thinking and shows that chemistry involves interesting and relevant topics The reorganization presents many core concepts in the first five chapters preparing students for later chapters In addition the author has added vignettes throughout the chapters referring to health technology the environment and society as well as to specific tools of direct use to students *Laboratory Manual to Accompany Introductory Chemistry* Uno Kask, Otto W.

Nitz, Martin G. Ondrus, Tammy J. Melton, 1993-07 This fifth edition of this laboratory manual emphasizes safety in the lab and discusses equipment requirements in the apparatus section at the beginning of each experiment It also features a revised art programme and explains the rationale for each experiment

Laboratory Manual in Engineering Chemistry : For the Students of JNTU Hyderabad Dr. B. Rama Devi & Dr. P. Aparna, The book is written to gain the basic knowledge on the principles of chemistry required for practical applications in engineering concepts This book consists organic and general chemistry experiments for chemical engineering for 1st and 2nd semester students The book also explains the precautions and safety rules for avoiding the accidents in chemistry laboratory It covers Estimation of Ferrous iron by Dichrometry and Permanganometry Method Estimation of Acetic Acid by Conductometric Titrations Estimation of the Amount of Fe²⁺ by Potentiometry Determination of an Acid Concentration using pH Meter Preparation of Nylon 6 and Bakelite Phenol Formaldehyde Resin Estimation of Acid Value of Given Lubricant Oil Determination of Rate of Corrosion of Mild Steel Preparation of Benzanilide from Benzophenone via the Oxime by Beckmann Rearrangement etc

Practical/Laboratory Manual Chemistry Class XII based on NCERT guidelines by Dr. S. C. Rastogi, Er. Meera Goyal Dr. S. C. Rastogi, Er. Meera Goyal, 2020-06-22

A Surface Chemistry

- 1 To prepare colloidal solution sol of starch
- 2 To prepare a colloidal solution of egg albumin
- 3 To prepare colloidal solution of gum
- 4 To prepare colloidal solution of aluminium hydroxide $Al(OH)_3$
- 5 To prepare colloidal solution of ferric hydroxide $Fe(OH)_3$
- 6 To prepare colloidal solution of arsenious sulphide As_2S_3
- 7 To purify a freshly prepared sol by dialysis
- 8 To compare the effectiveness of different common oils Castor oil cotton seed oil coconut oil kerosene oil mustard oil in forming emulsions

Viva Voce B Chemical Kinetics

- 1 To study the effect of concentration on the rate of reaction between sodium thiosulphate and hydrochloric acid
- 2 To study the effect of temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid
- 3 To study the rate of reaction of iodide ions with hydrogen peroxide at different concentrations of iodide ions
- 4 To study the rate of reaction between potassium iodate KIO_3 and sodium sulphite Na_2SO_3 using starch solution as indicator

Viva Voce C Thermochemistry

- 1 Determine the enthalpy of dissolution of copper sulphate $CuSO_4 \cdot 5H_2O$ in water at Room temperature
- 2 To determine the enthalpy of neutralization of the reaction between HCl and NaOH
- 3 To determine enthalpy change during the interaction between acetone and chloroform

Viva Voce D Electrochemistry

- 1 To study the variation of cell potential in $Zn|Zn^{2+}||Cu^{2+}|Cu$ with change in concentration of electrolytes $CuSO_4$ or $ZnSO_4$ at room temperature

Viva Voce E Chromatography

- 1 To separate the coloured components pigment present in the given extract of leaves and flowers by ascending paper chromatography and find their R_f values
- 2 To separate the coloured components present in the mixture of red and blue inks by ascending paper chromatography and find their R_f values
- 3 To separate Co^{2+} and Ni^{2+} ions present in the given mixture by using ascending paper chromatography and determine their R_f values

Viva Voce F Preparation of Inorganic Compounds

- 1 Preparation of double salt of ferrous ammonium sulphate Mohr's salt from ferrous sulphate and ammonium sulphate
- 2 To prepare a pure sample of potash alum fitkari
- 3 Preparation of

crystals of potassium ferric oxalate or potassium trioxalato ferrate III Viva Voce G Preparation of Organic Compounds 1 Preparation of iodoform from ethyl alcohol or acetone 2 Preparation of acetanilide in laboratory 3 Preparation of β -Naphthol aniline dye 4 To prepare a pure sample of dibenzalacetone 5 To prepare a pure sample of p -nitro acetanilide Viva Voce H Tests for the Functional Groups Present in Organic Compounds Viva Voce I Study of Carbohydrates Fats and Proteins 1 To study simple reactions of carbohydrate 2 To study simple reactions of fats 3 To study simple reactions of proteins 4 To investigate presence of carbohydrates fats and proteins in food stuffs Viva Voce J Volumetric Analysis 1 To prepare 250 ml of M 10 solution of oxalic acid 2 To prepare 250 ml of M 10 solution of ferrous ammonium sulphate 3 Prepare M 20 solution of oxalic acid with its help find out the molarity and strength of the given solution of potassium permanganate 4 Prepare M 20 solution of Mohr's salt using this solution determine the molarity and strength of potassium permanganate solution Viva Voce K Qualitative Analysis Viva Voce INVESTIGATORY PROJECTS 1 To study the presence of oxalate ions in guava fruit at different stages of ripening 2 To study the quantity of caseine present in different samples of milk 3 Preparation of soyabean milk and its comparison with natural milk with respect to curd formation effect of temperature etc 4 To study the effect of potassium bisulphite as food preservative at various concentrations 5 To study the digestion of starch by salivary amylase and the effect of pH and temperature on it 6 To study and compare the rate of fermentation of the following materials wheat flour gram flour potato juice and carrot juice 7 To extract essential oils present in saunf aniseed ajwain corum illaichi cardamom 8 To detect the presence of adulteration in fat oil and butter 9 To investigate the presence of NO_2 in brinjal

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