NOTE: for this problem set, unless stated otherwise, all standard cell potentials and other standard thermodynamic values are assumed to be reported at 298 K.

- Consider the demonstration where a piece of copper wire is being immersed in a solution of AgNO₃.
 - a) What is the sign of ΔG° for the demonstration you are observing? Explain.

Negative. Reaction is spontaneous.

b) Write out a balanced overall reaction for the demonstration, including all phases and stoichiometric coefficients:

$$2 \text{ Ag}^*(aq) + \text{Cu}(s) \rightarrow 2 \text{ Ag}(s) + \text{Cu}^{2*}(aq)$$

c) In your engineering reference manual you find the following half-reactions:

$$Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$$
 $E^+ = +0.34 \text{ V}$
 $Ag^+(aq) + e^- \rightarrow Ag(s)$ $E^- = +0.80 \text{ V}$

Determine the standard cell potential associated (E°cell) associated with this reaction.

$$E^{0}_{cell} = E^{0}_{red} - E^{0}_{ox} = 0.80 - 0.34 = 0.46 \text{ V}$$

d) Calculate the value of ΔG° and K for the demonstration reaction at 298 K.

$$\Delta G^{\circ} = -n F E_{cell}^{0} = -2 \times 96485 C mol^{-1} \times 0.460 V = -88766 J$$

$$= -89 kJ$$

$$ln K = -\frac{\Delta G^{\circ}}{RT} = \frac{88766 J}{1 mol \times 8.3145 J mol^{-1} K^{-1} \times 298 K} = 35.83$$

$$K = e^{35.83} = 3.62 \times 10^{15}$$

 Use your knowledge of thermodynamics to predict what would happen if we were to carry out the opposite experiment – a piece of silver in Cu(NO₃)₂.

Because dipping Cu in AgNO₃ was a spontaneous process, that means the opposite process should be non-spontaneous.

Note: both this answer and that for part a) make a subtle assumption. Can you see what it is?

Modeling Chemistry Unit 11 Answer Key

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Computational Modeling of Polymers Jozef Bicerano, 1992-03-17 MIX2 L. Niel Plummer, David L. Parkhurst, David R. 7th Grade Math Is Easy! So Easy Nathaniel Max Rock, 2006-02 Rock offers a guide to what it takes to Kosiur, 1975 Standards-Driven 7th Grade Math (Textboo Nathaniel Max Rock, 2006-02 This master seventh grade math Education guide features 180 pages of hands on standards driven study material on how to understand and retain seventh grade math Full explanations with step by step instructions are provided Worksheets for each standard are provided along with two full length 100 problem comprehensive final exams Education Applying modeling results in designing a global Chemistry in the Community (ChemCom) American Chemical Society, 2011-06-17 tropospheric experiment ,1982 Touted as the most successful NSF funded project published Chemistry in the Community ChemCom by the American Chemical Society ACS offers a meaningful and memorable chemistry program for all levels of high school students ChemCom covers traditional chemistry topics within the context of societal issues and real world scenarios Centered on decision making activities where students are responsible for generating data in an investigating analyzing that data and then applying their chemistry knowledge to solve the presented problem The text is intensively laboratory based with all 39 of the investigations integrated within the text not separate from the reading With the ChemCom program students learn more organic and biochemistry more environmental and industrial chemistry and more on the particulate nature of matter than other textbooks all within the relevance of solving problems that arise in everyday life Meticulously updated to meet the needs of today s teachers and students the new sixth edition of ChemCom adheres to the new science framework as well as the forthcoming next generation of science standards Incorporating advances in learning and cognitive sciences ChemCom's wide ranging coverage builds upon the concepts and principles found in the National Science Education Standards Correlations are available showing how closely aligned ChemCom is to these and other state standards Journal of Research of the National Bureau of Standards United States. National Bureau of Standards, 1976 **Ebook: Chemistry: The Molecular Nature of** Matter and Change Silberberg, 2015-01-16 Ebook Chemistry The Molecular Nature of Matter and Change The Role of Nanoparticles in Plant Nutrition under Soil Pollution Vishnu D. Rajput, Krishan K. Verma, Neetu Sharma, Tatiana Minkina, 2022-06-01 Nanotechnology has shown great potential in all spheres of life With the increasing pressure to meet the food demands of rapidly increasing population thus novel innovation and research are required in agriculture The principles of nanotechnology can be implemented to meet the challenges faced by agricultural demands Major challenges include the loss of nutrients in the soil and nutrient deficient plants which result in a lower crop yield and quality Subsequently consumption of such crops leads to malnourishment in humans especially in underprivileged and rural populations One convenient approach to tackle nutrient deficiency in plants is via the use of fertilizers however this method suffers from lower uptake efficiency in plants Another approach to combat nutrient deficiency in humans is via the use of supplements and diet

modifications however these approaches are less affordably viable in economically challenged communities and in rural areas Therefore the use of nano fertilizers to combat this problem holds the greatest potential Additionally nanotechnology can be used to meet other challenges in agriculture including enhancing crop yield protection from insect pests and animals and by use of nano pesticides and nano biosensors to carry out the remediation of polluted soils The future use of nanomaterials in soil ecosystems will be influenced by their capability to interact with soil constituents and the route of nanoparticles into the environment includes both natural and anthropogenic sources. The last decade has provided increasing research on the impact and use of nanoparticles in plants animals microbes and soils and yet these studies often lacked data involving the impact of nanoparticles on biotic and abiotic stress factors This book provides significant recent research on the use of nano fertilizers which can have a major impact on components of an ecosystem This work should provide a basis to further study these potential key areas in order to achieve sustainable and safe application of nanoparticles in agriculture and Technical Aerospace Reports ,1993 Physical Science Carson-Dellosa Publishing, 2015-03-09 Physical Science for grades 5 to 12 is designed to aid in the review and practice of physical science topics Physical Science covers topics such as scientific measurement force and energy matter atoms and elements magnetism and electricity. The book includes realistic diagrams and engaging activities to support practice in all areas of physical science The 100 Series science books span grades 5 to 12 The activities in each book reinforce essential science skill practice in the areas of life science physical science and earth science The books include engaging grade appropriate activities and clear thumbnail answer keys Each book has 128 pages and 100 pages or more of reproducible content to help students review and reinforce essential skills in individual science topics The series is aligned to current science standards Water-resources Investigations Report ,1976

WATEQF - a FORTRAN IV version of WATEQ L. Niel Plummer, Blair F. Jones, Alfred H. Truesdell, 1976 Resources in Education .1999 Report Availability Notice United States. Office of Naval Research. Ocean Science and Technology Division, 1976 **Industrial Photography** ,1993 **Publications of the National Bureau of Standards 1977 Catalog** United States. National Bureau of Standards, 1978 **Process Intensification Technologies for Green Chemistry** Kamelia Boodhoo, Adam Harvey, 2013-01-03 The successful implementation of greener chemical processes relies not only on the development of more efficient catalysts for synthetic chemistry but also and as importantly on the development of reactor and separation technologies which can deliver enhanced processing performance in a safe cost effective and energy efficient manner Process intensification has emerged as a promising field which can effectively tackle the challenges of significant process enhancement whilst also offering the potential to diminish the environmental impact presented by the chemical industry Following an introduction to process intensification and the principles of green chemistry this book presents a number of intensified technologies which have been researched and developed including case studies to illustrate their application to green chemical processes Topics covered include Intensified reactor technologies spinning disc reactors

microreactors monolith reactors oscillatory flow reactors cavitational reactors Combined reactor separator systems membrane reactors reactive distillation reactive extraction reactive absorption Membrane separations for green chemistry Industry relevance of process intensification including economics and environmental impact opportunities for energy saving and practical considerations for industrial implementation Process Intensification for Green Chemistry is a valuable resource for practising engineers and chemists alike who are interested in applying intensified reactor and or separator systems in a range of industries to achieve green chemistry principles

Report Availability Notice William V. Kielhorn, 1976

Introduction to Materials Science and Engineering Michael F. Ashby, Hugh Shercliff, David Cebon, 2023-08-01 Introduction to Materials Science and Engineering A Design Led Approach is ideal for a first course in materials for mechanical civil biomedical aerospace and other engineering disciplines The authors systematic method includes first analyzing and selecting properties to match materials to design through the use of real world case studies and then examining the science behind the material properties to better engage students whose jobs will be centered on design or applied industrial research As with Ashby s other leading texts the book emphasizes visual communication through material property charts and numerous schematics better illustrate the origins of properties their manipulation and fundamental limits Design led approach motivates and engages students in the study of materials science and engineering through real life case studies and illustrative applications Requires a minimum level of math necessary for a first course in Materials Science and Engineering Highly visual full color graphics facilitate understanding of materials concepts and properties Chapters on materials selection and design are integrated with chapters on materials fundamentals enabling students to see how specific fundamentals can be important to the design process Several topics are expanded separately as Guided Learning Units Crystallography Materials Selection in Design Process Selection in Design and Phase Diagrams and Phase Transformations For instructors a solutions manual image bank and other ancillaries are available at https educate elsevier com book details 9780081023990

The Enigmatic Realm of Modeling Chemistry Unit 11 Answer Key: Unleashing the Language is Inner Magic

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