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## PHYSICAL SCIENCES PAPER 2 (CHEMISTRY)

GRADE 12

### TERMS & DEFINITIONS, QUESTIONS & ANSWERS PER TOPIC

2021



#### TABLE OF CONTENTS



HOW TO USE THIS DOCUMENT .....	2
TERMS AND DEFINITIONS .....	3
QUESTIONS .....	9
ORGANIC MOLECULES: NOMENCLATURE .....	9
ORGANIC MOLECULES: PHYSICAL PROPERTIES .....	17
ORGANIC MOLECULES: ORGANIC REACTIONS .....	24
REACTION RATE AND ENERGY IN CHEMICAL REACTIONS .....	31
CHEMICAL EQUILIBRIUM .....	42
ACIDS AND BASES .....	49
GALVANIC CELLS .....	56
ELECTROLYTIC CELLS .....	63
ANSWERS TO QUESTIONS .....	68
ORGANIC MOLECULES: NOMENCLATURE .....	68
ORGANIC MOLECULES: PHYSICAL PROPERTIES .....	74
ORGANIC MOLECULES: ORGANIC REACTIONS .....	80
REACTION RATE AND ENERGY IN CHEMICAL REACTIONS .....	86
CHEMICAL EQUILIBRIUM .....	96
ACIDS AND BASES .....	107
GALVANIC CELLS .....	114
ELECTROLYTIC CELLS .....	117
BIBLIOGRAPHY .....	119



# Physical Science Paper 2 September 2013 Memo

**Karin Nielsen-Saines**



## **Physical Science Paper 2 September 2013 Memo:**

**Spacecraft Dynamics and Control** Enrico Canuto, Carlo Novara, Donato Carlucci, Carlos Perez-Montenegro, Luca Massotti, 2018-03-08 Spacecraft Dynamics and Control The Embedded Model Control Approach provides a uniform and systematic way of approaching space engineering control problems from the standpoint of model based control using state space equations as the key paradigm for simulation design and implementation The book introduces the Embedded Model Control methodology for the design and implementation of attitude and orbit control systems The logic architecture is organized around the embedded model of the spacecraft and its surrounding environment The model is compelled to include disturbance dynamics as a repository of the uncertainty that the control law must reject to meet attitude and orbit requirements within the uncertainty class The source of the real time uncertainty estimation prediction is the model error signal as it encodes the residual discrepancies between spacecraft measurements and model output The embedded model and the uncertainty estimation feedback noise estimator in the book constitute the state predictor feeding the control law Asymptotic pole placement exploiting the asymptotes of closed loop transfer functions is the way to design and tune feedback loops around the embedded model state predictor control law reference generator The design versus the uncertainty class is driven by analytic stability and performance inequalities The method is applied to several attitude and orbit control problems The book begins with an extensive introduction to attitude geometry and algebra and ends with the core themes state space dynamics and Embedded Model Control Fundamentals of orbit attitude and environment dynamics are treated giving emphasis to state space formulation disturbance dynamics state feedback and prediction closed loop stability Sensors and actuators are treated giving emphasis to their dynamics and modelling of measurement errors Numerical tables are included and their data employed for numerical simulations Orbit and attitude control problems of the European GOCE mission are the inspiration of numerical exercises and simulations The suite of the attitude control modes of a GOCE like mission is designed and simulated around the so called mission state predictor Solved and unsolved exercises are included within the text and not separated at the end of chapters for better understanding training and application Simulated results and their graphical plots are developed through MATLAB Simulink code

**On Mars** Edward Clinton Ezell, Linda Neuman Ezell, 2013-02-19 Although it was only designed for a ninety day surface mission the Viking 1 lander ultimately transmitted science messages to Earth for seven years This authoritative history chronicles the remarkable achievements of the Viking program during its first three decades Commissioned by NASA it recounts the events surrounding the first planetary landing on Earth's closest neighbor and the first on site search for evidence of extraterrestrial life It also portrays a human drama in which thousands of professionals from government industry and academia joined together to accomplish the seemingly impossible This history begins with a survey of the qualities that make the surface and atmosphere of Mars prime targets for scientific investigation A retrospective of NASA's Mariner program follows detailing the series of robotic interplanetary

probes that led to the initiation of the Viking program in 1968 The authors trace the ensuing technological developments including the first lander vehicles and orbiter They also profile the cooperation of managerial technical and scientific teams during the mission s data gathering and analysis phases The final chapters outline the scientific results of the Viking investigations examine some of the unresolved questions and consider possible future explorations Dozens of photos taken by Viking cameras illuminate the text

**Heretic's Guide To Management** Paul Culmsee,2016-07-07 Management techniques such as strategic planning project management or operational budgeting aim to reduce ambiguity and provide clarity So it is one of the great ironies of modern corporate life that these techniques often end up doing the opposite increasing ambiguity rather than reducing it It is easy enough to understand why organizations are complex entities and it is unreasonable to expect management models such as those that fit neatly into a 2 2 matrix or a predetermined checklist to work in the real world Indeed expecting them to work as advertised is akin to colouring a paint by numbers Mona Lisa with the expectation of recreating Da Vinci s masterpiece Ambiguity has not been tamed reality will still impose itself no matter how alluring the model is Unfortunately most of us have a deep aversion to situations that involve even a hint of ambiguity Recent research in neuroscience has revealed the reason for this ambiguity is processed in the parts of the brain which regulate our emotional responses As a result many people associate ambiguity with feelings of anxiety When kids feel anxious they turn to transitional objects such as teddy bears or security blankets providing them with a sense of stability when situations or events seem overwhelming We contend that as grown ups we don t actually stop using teddy bears they take a different form Backed by research we illustrate that management models fads and frameworks are akin to teddy bears They provide the same sense of comfort and certainty to corporate managers and minions as real teddies do to distressed kids This is not a problem in many cases Children usually outgrow their need for a teddy unless if development is disrupted or arrested in some way If this happens the transitional object can become a fetish an object that is held on to with a pathological intensity simply for the comfort that it offers in the face of ambiguity The corporate reliance on simplistic solutions for the complex challenges faced is akin to little Johnny believing that everything will be OK provided he clings on to Teddy Ambiguity is a primal force that drives much of our behaviour It is typically viewed negatively something to be avoided or to be controlled The truth however is that it is a force that can be used in positive ways too The Force that gave the Dark Side their power in the Star Wars movies was harnessed by the Jedi in positive ways Similarly this new management book shows how ambiguous situations so common in the corporate world are processed by the brain and the behaviours that often arise as a consequence More importantly though it shows you how to harness that ambiguity to achieve outstanding results

Tunnel Visions Michael Riordan,Lilian Hoddeson,Arienne W. Kolb,2015-11-20 A detailed and engaging account of the development of the superconducting supercollider one of the largest scientific undertakings in the United States Journal of American History Starting in the 1950s US physicists dominated the search for elementary particles aided by the association

of this research with national security they held this position for decades In an effort to maintain their hegemony and track down the elusive Higgs boson they convinced President Reagan and Congress to support construction of the multibillion dollar Superconducting Super Collider project in Texas the largest basic science project ever attempted But after the Cold War ended and the estimated SSC cost surpassed ten billion dollars Congress terminated the project in October 1993 Drawing on extensive archival research contemporaneous press accounts and over one hundred interviews with scientists engineers government officials and others involved Tunnel Visions tells the riveting story of the aborted SSC project The authors examine the complex interrelated causes for its demise including problems of large project management continuing cost overruns and lack of foreign contributions In doing so they ask whether Big Science has become too large and expensive including whether academic scientists and their government overseers can effectively manage such an enormous undertaking Focusing on the scientific technical and political conflicts that led to delays ever rising costs and eventually the SSC's cancellation by Congress Tunnel Visions is a true techno thriller Burton Richter winner of the Nobel Prize in Physics Most good science stories are tales of discovery and success but failure can be just as riveting Here two historians and an archivist describe the greatest particle physics experiment that never was Scientific American *Where Have All the Democrats Gone?* Ruy Teixeira, John B. Judis, 2023-11-07 A Wall Street Journal Best Political Book of 2023 A much needed wake up call for the Democrats which reveals how the party has lost sight of its core principles and endangered its political future from the authors of one of the most influential political books of the 21st century The New York Times For decades American politics has been plagued by a breakdown between the Democratic and Republican parties in which victory has inevitably led to defeat and vice versa Both parties have lost sight of the people at the center of the American electorate leading to polarization and paralysis In *Where Have All the Democrats Gone* John B Judis and Ruy Teixeira reveal the tectonic changes shaping the country's current political landscape that both pundits and political scientists have missed The Democratic Party once the preserve of small towns as well as big cities and of the industrial working class and the newly immigrated has abandoned and even actively alienated many of these voters In this clarion call and essential argument for common sense and common ground Judis and Teixeira reveal the transformation of American politics and provide a razor sharp critique of where the Democrats have gone awry and how they can avoid political disaster in the days ahead **The Lab Book** Darren Wershler, Lori Emerson, Jussi Parikka, 2022-03-22 An important new approach to the study of laboratories presenting a practical method for understanding labs in all walks of life From the Big Science of Bell Laboratories to the esoteric world of science chambers to university media labs to neighborhood makerspaces places we call labs are everywhere but how exactly do we account for the wide variety of ways that they produce knowledge More than imitations of science and engineering labs many contemporary labs are hybrid forms that require a new methodological and theoretical toolkit to describe The Lab Book investigates these vital creative spaces presenting readers with the concept of the hybrid lab and

offering an extended and rare critical investigation of how labs have proliferated throughout culture Organized by interpretive categories such as space infrastructure and imaginaries The Lab Book uses both historical and contemporary examples to show how laboratories have become fundamentally connected to changes in the contemporary university Its wide reach includes institutions like the MIT Media Lab the Tuskegee Institute s Jesup Wagon ACTLab and the Media Archaeological Fundus The authors cover topics such as the evolution and delineation of lab based communities how labs tools and technologies contribute to defining their space and a glossary of key hybrid lab techniques Providing rich historical breadth and depth The Lab Book brings into focus a critical but often misunderstood aspect of the contemporary arts and humanities

**Encyclopedia of Information Science and Technology, Third Edition** Khosrow-Pour, D.B.A., Mehdi,2014-07-31 This 10 volume compilation of authoritative research based articles contributed by thousands of researchers and experts from all over the world emphasized modern issues and the presentation of potential opportunities prospective solutions and future directions in the field of information science and technology Provided by publisher *Law, Death, and Robots* Keri Grieman,2024-10-17 Can the law keep up with AI This book examines liability and regulation for artificial intelligence causing serious physical harm both now and in the future While AI moves quickly regulation follows more slowly an increasing problem for an evolutionary fast paced emerging technology AI has the potential to save lives but in doing so will have the potential to take them as well How do we future proof law and regulation to incentivise life saving innovation as safely as possible This book details how to regulate AI in high risk civil applications for example automated vehicles and medicine addressing both liability and regulatory structure It highlights crucial liability themes for technology governance provides tools to bridge the gap between regulators and technologists examines jurisdictional approaches to AI regulation in the EU UK USA and Singapore and ultimately suggests a jurisdiction agnostic blueprint for regulation **Title**

**Announcement Bulletin** ,1956 **Shaky Foundations** Mark Solovey,2013-02-08 Numerous popular and scholarly accounts have exposed the deep impact of patrons on the production of scientific knowledge and its applications Shaky Foundations provides the first extensive examination of a new patronage system for the social sciences that emerged in the early Cold War years and took more definite shape during the 1950s and early 1960s a period of enormous expansion in American social science By focusing on the military the Ford Foundation and the National Science Foundation Mark Solovey shows how this patronage system presented social scientists and other interested parties including natural scientists and politicians with new opportunities to work out the scientific identity social implications and public policy uses of academic social research Solovey also examines significant criticisms of the new patronage system which contributed to widespread efforts to rethink and reshape the politics patronage social science nexus starting in the mid 1960s Based on extensive archival research Shaky Foundations addresses fundamental questions about the intellectual foundations of the social sciences their relationships with the natural sciences and the humanities and the political and ideological import of academic

social inquiry      **Complexity, Security and Civil Society in East Asia** Peter Hayes, Kiho Yi, 2015-06-22 Complexity Security and Civil Society in East Asia offers the latest understanding of complex global problems in the region including nuclear weapons urban insecurity energy and climate change Detailed case studies of China North and South Korea and Japan demonstrate the importance of civil society and civic diplomacy in reaching shared solutions to these problems in East Asia and beyond Each chapter describes regional civil society initiatives that tackle complex challenges to East Asia s security In doing so the book identifies key pressure points at which civil society can push for constructive changes especially ones that reduce the North Korean threat to its neighbors Unusually this book is both theoretical and practical Complexity Security and Civil Society in East Asia presents strategies that can be led by civil society and negotiated by its diplomats to realize peace security and sustainability worldwide It shows that networked civic diplomacy offers solutions to these urgent issues that official complex diplomacy cannot By providing a new theoretical framework based on empirical observation this volume is a must read for diplomats scholars students journalists activists and individual readers seeking insight into how to solve the crucial issues of our time      *Algebraic  $\overline{\mathbb{Q}}$ -Groups as Abstract Groups* Olivier Frécon, 2018-10-03 The author analyzes the abstract structure of algebraic groups over an algebraically closed field For of characteristic zero and a given connected affine algebraic  $\mathbb{Q}$  group the main theorem describes all the affine algebraic  $\mathbb{Q}$  groups such that the groups and are isomorphic as abstract groups In the same time it is shown that for any two connected algebraic  $\mathbb{Q}$  groups and the elementary equivalence of the pure groups and implies that they are abstractly isomorphic In the final section the author applies his results to characterize the connected algebraic groups all of whose abstract automorphisms are standard when is either  $\mathbb{Q}$  or of positive characteristic In characteristic zero a fairly general criterion is exhibited      *Pacific International Conference on Aerospace Science and Technology*, 1994      People's Diplomacy Kazushi Minami, 2024-03-15 In People s Diplomacy Kazushi Minami shows how the American and Chinese people rebuilt US China relations in the 1970s a pivotal decade bookended by Richard Nixon s 1972 visit to China and 1979 normalization of diplomatic relations Top policymakers in Washington and Beijing drew the blueprint for the new bilateral relationship but the work of building it was left to a host of Americans and Chinese from all walks of life who engaged in people to people exchanges After two decades of estrangement and hostility caused by the Cold War these people dramatically changed the nature of US China relations Americans reimagined China as a country of opportunities irresistible because of its prodigious potential while Chinese reinterpreted the United States as an agent of modernization capable of enriching their country and rejuvenating their lives Drawing on extensive research at two dozen archives in the United States and China People s Diplomacy redefines contemporary US China relations as a creation of the American and Chinese people      **Tectonic Evolution, Collision, and Seismicity of Southwest Asia** Rasoul Sorkhabi, 2017-12-21 Southwest Asia is one of the most remarkable regions on Earth in terms of active faulting and folding large magnitude earthquakes volcanic landscapes

petroliferous foreland basins historical civilizations as well as geologic outcrops that display the protracted and complex 540 m y stratigraphic record of Earth s Phanerozoic Era Emerged from the birth and demise of the Paleo Tethys and Neo Tethys oceans southwest Asia is currently the locus of ongoing tectonic collision between the Eurasia Arabia continental plates The region is characterized by the high plateaus of Iran and Anatolia fringed by the lofty ranges of Zagros Alborz Caucasus Taurus and Pontic mountains the region also includes the strategic marine domains of the Persian Gulf Gulf of Oman Caspian and Mediterranean This 19 chapter volume published in honor of Manuel Berberian a preeminent geologist from the region brings together a wealth of new data analyses and frontier research on the geologic evolution collisional tectonics active deformation and historical and modern seismicity of key areas in southwest Asia

### **Fatigue and Corrosion in Metals**

Pietro Paolo Milella,2024-03-19 With its combination of readability love for details and rigor Fatigue and Corrosion in Metals has become an authoritative reference work that has quickly established itself as the most comprehensive guide for fatigue and corrosion design available to date It has been adopted by several universities as reference textbook and consulted by professional engineers and scholars worldwide This must have Second Edition completely revisited to account for advances in the decade since the previous edition was published includes A new Chapter on damage nucleation A new Chapter on Very High Cycle Fatigue A new Chapter on fatigue testing and fatigue S N curve determination Expanded analysis of surface treatments and inclusions effect on fatigue Expanded treatment of volume process effect on fatigue Expanded treatments of corrosion and hydrogen embrittlement In addition to these enhancements it includes a detailed treatment of Phenomenology and morphological aspects of fatigue Surface treatments conditions and nonmetallic inclusions effects on fatigue Stress and strain based fatigue analysis Mean stress and notch effect on fatigue Cumulative damage and multiaxial fatigue Probabilistic analysis application to fatigue design Fatigue in welds Stress corrosion and hydrogen embrittlement Fracture mechanics application to fatigue and corrosion It serves as a valuable and needful information source on the desktop of anyone involved with fatigue and corrosion in metals

### Computational Propaganda

Samuel C. Woolley,Philip N. Howard,2019 Social media platforms do not just circulate political ideas they support manipulative disinformation campaigns While some of these disinformation campaigns are carried out directly by individuals most are waged by software commonly known as bots programmed to perform simple repetitive robotic tasks Some social media bots collect and distribute legitimate information while others communicate with and harass people manipulate trending algorithms and inundate systems with spam Campaigns made up of bots fake accounts and trolls can be coordinated by one person or a small group of people to give the illusion of large scale consensus Some political regimes use political bots to silence opponents and to push official state messaging to sway the vote during elections and to defame critics human rights defenders civil society groups and journalists This book argues that such automation and platform manipulation amounts to a new political communications mechanism that Samuel Woolley and Philip N Noward call computational propaganda This differs from older styles of propaganda in that



it uses algorithms automation and human curation to purposefully distribute misleading information over social media networks while it actively learns from and mimicks real people so as to manipulate public opinion across a diverse range of platforms and device networks This book includes cases of computational propaganda from nine countries both democratic and authoritarian and four continents North and South America Europe and Asia covering propaganda efforts over a wide array of social media platforms and usage in different types of political processes elections referenda and during political crises

Havacılık Meteorolojisine Giriş Mikdat Kadioğlu, Havacılık bahsetmeye başladın zandan itibaren meteoroloji olmazsa olmaz bilim disiplinlerinden biri haline gelir ki alanın oldukça girift olan ilikisi bir hava aracının gkyzindeki seyahati veyahut kaderi için vazgeçilmez bir unsurdur Bu noktadan hareketle meteoroloji havacılığın gelişmesi için en önemli bilim dallarından biridir demek kanaatimce en doğrudan malmalardan biri olacaktır Mill Teknoloji Hamlesi için en önemli atılımlardan biri haline gelen Mill SHA larımız askeri alanlardan afetlere orman yangınlarındaki zensiz hareketi izlemeye kadar birçok alanda kullanılmaya geldi Tm hava araçları arasında oldu gibi HA ların uçuşu içinde hava hareketlerinin belirleyici bir rol var HA lar hava akımı ve aerodinamik kuvvetlerden faydalanarak uçuşları ve bu yüzden meteorolojik olayların etkisi büyük olur Uzaktan tamamen otonom bir sistemle yönetilen bir uçuşun dinamik süreçleri atmosferin mevcut durumuna da bağlıdır Bu nedenle atmosferde meydana gelen türbülans fırtına buzlanma gibi iddetli hava olayları HA ların performans ve güvenli uçuşu için belirleyici niteliktedir Seluk Bayraktar Hava uçuş performansını ve güvenli ini etkileyen önemli bir faktördür Sıkla k sıkla veya soğuk nemli k veya kuruluk rüzgar hızı sakini veya fırtınalı gürültü k berraklık veya bulanıklık ve barometrik basınç yksek veya düşük gibi değişkenlere göre belirli bir zaman ve mekandaki atmosferin durumudur Hava durumu terimi yksek rüzgarlar gibi olumsuz veya yksek atmosferik durumları içinde geçerlidir Aslında hava araçları bir zaman tarafsız değildir Savaşta ve barışta hep bize karşı veya bizimle beraberdir Temel kural budur Eğer avantajımız olacak şekilde onları kullanırsak hava müfitemiz kullanmazsak dmanımız olur Sonu olarak savaş ve havacılık tarihimiz boyunca hava araçları na dikkat etmediğimiz zaman havanın dmanımız dikkat ettiğimiz zaman da müfitemiz oldu unu defalarca tecrübe ettik Bu nedenlerden dolayı bu kitap savaşta ve barışta aletli ve veya aletsiz sivil asker ya da sportif amaçları ile uçuş yapan ya da bu uçuşlara hizmet veren tüm havacılık camiasının hava durumuyla ilgili meteorolojik olayları salam bir şekilde anlamaya kavrama analitik düşünme ve karar verebilme becerilerini geliştirmek için hazırlanmıştır

**Government Reports Announcements & Index** ,1987-09 *The Reality of Precaution* Jonathan B. Wiener, Michael D. Rogers, James K. Hammitt, Peter H. Sand, 2013-05-13 The Precautionary Principle has sparked the central controversy over European and U S risk regulation The Reality of Precaution is the most comprehensive study to go beyond precaution as an abstract principle and test its reality in practice This groundbreaking resource combines detailed case studies of a wide array of risks to health safety environment and security a broad quantitative analysis and cross cutting chapters on politics law and perceptions The authors rebut the rhetoric of conflicting European and American approaches to risk and show that the reality has been the selective application of precaution to

particular risks on both sides of the Atlantic as well as a constructive exchange of policy ideas toward better regulation The book offers a new view of precaution regulatory reform comparative analysis and transatlantic relations

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## **Table of Contents Physical Science Paper 2 September 2013 Memo**

1. Understanding the eBook Physical Science Paper 2 September 2013 Memo
  - The Rise of Digital Reading Physical Science Paper 2 September 2013 Memo
  - Advantages of eBooks Over Traditional Books
2. Identifying Physical Science Paper 2 September 2013 Memo
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Physical Science Paper 2 September 2013 Memo
  - User-Friendly Interface
4. Exploring eBook Recommendations from Physical Science Paper 2 September 2013 Memo
  - Personalized Recommendations
  - Physical Science Paper 2 September 2013 Memo User Reviews and Ratings
  - Physical Science Paper 2 September 2013 Memo and Bestseller Lists
5. Accessing Physical Science Paper 2 September 2013 Memo Free and Paid eBooks
  - Physical Science Paper 2 September 2013 Memo Public Domain eBooks
  - Physical Science Paper 2 September 2013 Memo eBook Subscription Services
  - Physical Science Paper 2 September 2013 Memo Budget-Friendly Options

6. Navigating Physical Science Paper 2 September 2013 Memo eBook Formats
  - ePub, PDF, MOBI, and More
  - Physical Science Paper 2 September 2013 Memo Compatibility with Devices
  - Physical Science Paper 2 September 2013 Memo Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Physical Science Paper 2 September 2013 Memo
  - Highlighting and Note-Taking Physical Science Paper 2 September 2013 Memo
  - Interactive Elements Physical Science Paper 2 September 2013 Memo
8. Staying Engaged with Physical Science Paper 2 September 2013 Memo
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Physical Science Paper 2 September 2013 Memo
9. Balancing eBooks and Physical Books Physical Science Paper 2 September 2013 Memo
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Physical Science Paper 2 September 2013 Memo
10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Physical Science Paper 2 September 2013 Memo
  - Setting Reading Goals Physical Science Paper 2 September 2013 Memo
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Physical Science Paper 2 September 2013 Memo
  - Fact-Checking eBook Content of Physical Science Paper 2 September 2013 Memo
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
  - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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