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## PHYSICAL SCIENCES PAPER 2 (CHEMISTRY)

GRADE 12

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

2021



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# Physical Science Paper 2 Memorandum September 2013

**Aileen Fyfe, Noah Moxham, Julie  
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Røstvik**



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

**The Secure and the Dispossessed** Nick Buxton, Ben Hayes, 2015-11-20 While the world's scientists and many of its inhabitants despair at the impact of climate change corporate and military leaders see nothing but opportunities For them melting ice caps mean newly accessible fossil fuels borders to be secured from climate refugees social conflicts to be managed and more failed states in which to intervene They are securing their assets at the expense of the planet and its inhabitants The Secure and the Dispossessed looks at these deadly approaches with a critical eye It also considers the flip side that the legitimacy of the elite is under unprecedented pressure from resistance by communities to resource grabs to those creating new ecological and socially just models for managing our energy food and water Topics covered include geoengineering militarism refugee protection greenwashing and the agricultural crisis among others Adaptation and resilience to a climate changed world is desperately needed but the form it will take will affect all of our futures

**Space Studies Board Annual Report 2013** National Research Council, Division on Engineering and Physical Sciences, Space Studies Board, 2014-04-09 The original charter of the Space Science Board was established in June 1958 3 months before the National Aeronautics and Space Administration NASA opened its doors The Space Science Board and its successor the Space Studies Board SSB have provided expert external and independent scientific and programmatic advice to NASA on a continuous basis from NASA's inception until the present The SSB has also provided such advice to other executive branch agencies including the National Oceanic and Atmospheric Administration NOAA the National Science Foundation NSF the U S Geological Survey USGS the Department of Defense as well as to Congress Space Studies Board Annual Report 2013 covers a message from the chair of the SSB Charles F Kennel This report also explains the origins of the Space Science Board how the Space Studies Board functions today the SSB's collaboration with other National Research Council units assures the quality of the SSB reports acknowledges the audience and sponsors and expresses the necessity to enhance the outreach and improve dissemination of SSB reports This report will be relevant to a full range of government audiences in civilian space research including NASA NSF NOAA USGS and the Department of Energy as well members of the SSB policy makers and researchers

**This Changes Everything** Naomi Klein, 2014-09-16 The most important book yet from the author of the international bestseller The Shock Doctrine a brilliant explanation of why the climate crisis challenges us to abandon the core free market ideology of our time restructure the global economy and remake our political systems In short either we embrace radical change ourselves or radical changes will be visited upon our physical world The status quo is no longer an option In This Changes Everything Naomi Klein argues that climate change isn't just another issue to be neatly filed between taxes and health care It's an alarm that calls us to fix an economic system that is already failing us in many ways Klein meticulously builds the case for how massively reducing our greenhouse emissions is our best chance to simultaneously reduce gaping inequalities re-imagine our broken democracies and rebuild our gutted local economies She

exposes the ideological desperation of the climate change deniers the messianic delusions of the would be geoengineers and the tragic defeatism of too many mainstream green initiatives And she demonstrates precisely why the market has not and cannot fix the climate crisis but will instead make things worse with ever more extreme and ecologically damaging extraction methods accompanied by rampant disaster capitalism Klein argues that the changes to our relationship with nature and one another that are required to respond to the climate crisis humanely should not be viewed as grim penance but rather as a kind of gift a catalyst to transform broken economic and cultural priorities and to heal long festering historical wounds And she documents the inspiring movements that have already begun this process communities that are not just refusing to be sites of further fossil fuel extraction but are building the next regeneration based economies right now Can we pull off these changes in time Nothing is certain Nothing except that climate change changes everything And for a very brief time the nature of that change is still up to us *A History of Scientific Journals* Aileen Fyfe, Noah Moxham, Julie

McDougall-Waters, Camilla Mørk Røstvik, 2022-10-03 Modern scientific research has changed so much since Isaac Newton's day it is more professional collaborative and international with more complicated equipment and a more diverse community of researchers Yet the use of scientific journals to report share and store results is a thread that runs through the history of science from Newton's day to ours Scientific journals are now central to academic research and careers Their editorial and peer review processes act as a check on new claims and findings and researchers build their careers on the list of journal articles they have published The journal that reported Newton's optical experiments still exists First published in 1665 and now fully digital the Philosophical Transactions has carried papers by Charles Darwin Dorothy Hodgkin and Stephen Hawking It is now one of eleven journals published by the Royal Society of London Unrivalled insights from the Royal Society's comprehensive archives have enabled the authors to investigate more than 350 years of scientific journal publishing The editorial management business practices and financial difficulties of the Philosophical Transactions and its sibling Proceedings reveal the meaning and purpose of journals in a changing scientific community At a time when we are surrounded by calls to reform the academic publishing system it has never been more urgent that we understand its history

Vibrio ecology, pathogenesis and evolution Rita R Colwell, Daniela Ceccarelli, 2014-10-24 Vibrios are Gram negative bacilli that occur naturally in marine estuarine and freshwater systems Some species include human and animal pathogens capable of causing gastroenteritis wound infections cholera and fatal septicemia Over the past decades cutting edge research on Vibrio genomics has promoted a tremendous advance in our knowledge of these pathogens Significant developments include the discovery of emerging epidemic clones tracking the spread of new strain variants and an intensified appreciation of the role of mobile genetic elements in antibiotic resistance spread as well as pathogenesis Furthermore improved understanding of the interaction of Vibrios with a variety of living organisms in the aquatic environment has documented the significant role of environmental reservoirs in their seasonal cycle favoring persistence of the pathogen during inter epidemic periods and

enhancing disease transmission This Research Topic is dedicated to our current understanding in these areas and will bring together leading experts in the field to provide a deep overview of Vibrios ecology and evolution and will suggest the pathway of future research in this field

**Bulk Collection of Signals Intelligence** National Research Council, Division on Engineering and Physical Sciences, Computer Science and Telecommunications Board, Committee on Responding to Section 5(d) of Presidential Policy Directive 28: The Feasibility of Software to Provide Alternatives to Bulk Signals Intelligence Collection, 2015-03-24 The Bulk Collection of Signals Intelligence Technical Options study is a result of an activity called for in Presidential Policy Directive 28 PPD 28 issued by President Obama in January 2014 to evaluate U S signals intelligence practices The directive instructed the Office of the Director of National Intelligence ODNI to produce a report within one year assessing the feasibility of creating software that would allow the intelligence community more easily to conduct targeted information acquisition rather than bulk collection ODNI asked the National Research Council NRC the operating arm of the National Academy of Sciences and National Academy of Engineering to conduct a study which began in June 2014 to assist in preparing a response to the President Over the ensuing months a committee of experts appointed by the Research Council produced the report

Indigenous Peoples' Governance of Land and Protected Territories in the Arctic Thora Martina Herrmann, Thibault Martin, 2015-12-22 This book addresses critical questions and analyses key issues regarding Indigenous Aboriginal Peoples and governance of land and protected areas in the Arctic It brings together contributions from scientists indigenous and non indigenous researchers local leaders and members of the policy community that document Indigenous Aboriginal approaches to governance of land and protected areas at the local regional and international level explore new territorial governance models that are emerging as part of the Indigenous Aboriginal governance within Arctic States provinces territories and regions analyse the recognition or lack thereof concerning indigenous rights to self determination in the Arctic and examine how traditional decision making arrangements and practices can be linked with governments in the process of good governance The book highlights essential lessons learned success stories and remaining issues all of which are useful to address issues of Arctic governance of land and protected areas today and which could also be relevant for future governance arrangements

*Overcoming Barriers to Deployment of Plug-in Electric Vehicles* National Research Council, Transportation Research Board, Division on Engineering and Physical Sciences, Board on Energy and Environmental Systems, Committee on Overcoming Barriers to Electric-Vehicle Deployment, 2015-06-26 In the past few years interest in plug in electric vehicles PEVs has grown Advances in battery and other technologies new federal standards for carbon dioxide emissions and fuel economy state zero emission vehicle requirements and the current administration's goal of putting millions of alternative fuel vehicles on the road have all highlighted PEVs as a transportation alternative Consumers are also beginning to recognize the advantages of PEVs over conventional vehicles such as lower operating costs smoother operation and better acceleration the ability to fuel up at home and zero tailpipe emissions when the vehicle operates solely

on its battery There are however barriers to PEV deployment including the vehicle cost the short all electric driving range the long battery charging time uncertainties about battery life the few choices of vehicle models and the need for a charging infrastructure to support PEVs What should industry do to improve the performance of PEVs and make them more attractive to consumers At the request of Congress Overcoming Barriers to Deployment of Plug in Electric Vehicles identifies barriers to the introduction of electric vehicles and recommends ways to mitigate these barriers This report examines the characteristics and capabilities of electric vehicle technologies such as cost performance range safety and durability and assesses how these factors might create barriers to widespread deployment Overcoming Barriers to Deployment of Plug in Electric Vehicles provides an overview of the current status of PEVs and makes recommendations to spur the industry and increase the attractiveness of this promising technology for consumers Through consideration of consumer behaviors tax incentives business models incentive programs and infrastructure needs this book studies the state of the industry and makes recommendations to further its development and acceptance

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

**Ocean Science and the British Cold War State** Samuel A. Robinson,2018-05-03 This book focuses on the activities of the scientific staff of the British National Institute of Oceanography during the Cold War Revealing how issues such as intelligence gathering environmental surveillance the identification of enemy science along with administrative practice informed and influenced the Institute s Cold War program In turn this program helped shape decisions taken by Government military and the civil service towards science in post war Britain This was not simply a case of government ministers choosing to patronize particular scientists but a relationship between politics and science that profoundly impacted on the future of ocean science in Britain

**Scientists at War** Sarah Bridger,2015-04-06 Sarah Bridger examines the ethical debates that tested the U S scientific community during the Cold War and scientists contributions to military technologies and strategic policymaking from the dawning atomic age through the Strategic Defense Initiative Star Wars in the 1980s which sparked cross generational opposition among scientists

**Biofuels for Aviation** Christopher Chuck,2016-06-02 Biofuels for Aviation Feedstocks Technology and Implementation presents the issues surrounding the research and use of biofuels for aviation such as policy markets certification and performance requirements life cycle assessment and the economic and technical barriers to their full implementation Readers involved in bioenergy and aviation sectors research planning or policy making activities will benefit from this thorough overview The aviation industry s commitment to reducing GHG emissions along with increasing oil prices have sparked the need for renewable and affordable energy sources tailored to this sector s very specific needs As jet engines cannot be readily electrified turning to biofuels is the most viable option However aviation is a type of transportation for which traditional biofuels such as bioethanol and biodiesel do not fulfill key fuel requirements Therefore different solutions to this situation are being researched and tested around the globe which makes navigating this scenario particularly challenging This book guides readers through this intricate subject bringing them up to speed with its current status and future prospects both from the academic and the industry point of view Science and technology chapters delve into the technical aspects of the currently tested and the most promising technology in development as well as their respective feedstocks and the use of additives as a way of adapting them to meet certain specifications Conversion processes such as hydrotreatment synthetic biology pyrolysis hydrothermal liquefaction and Fisher Tropsch are explored and their results are assessed for current and future viability Presents the current status of biofuels for the aviation sector including technologies that are currently in use and the most promising future technologies their production processes and viability Explains the requirements for certification and performance of aviation fuels and how that can be achieved by biofuels Explores the economic and policy issues as well as life cycle assessment a comparative techno economic analysis of promising technologies and a roadmap to the future Explores conversion processes such as

hydrotreatment synthetic biology pyrolysis hydrothermal liquefaction and Fisher Tropsch      **Technological Innovation in Legacy Sectors** William B. Bonvillian, Charles Weiss, 2015-08-18 The American economy misses opportunities for innovation growth and job creation because of a neglected problem the resistance to innovation from Legacy sectors like energy manufacturing and health care which constitute most of our economy The book offers systematic strategies to overcome the structural obstacles to innovation in critically important Legacy sectors      Breakout Newt Gingrich, 2013-11-04 It is not between the Left and the Right but between the past and the future America is on the edge of a breakout In fact we are poised for one of the most spectacular leaps in human well being in history Pioneers of the future innovators and entrepreneurs are achieving breakthroughs in medicine transportation energy education and other fields that will make the world a dramatically different and better place Unless the prison guards of the past stop them Every American must choose a side Will you be a champion of the future or a prisoner of the past Every potential breakthrough has to get past a host of individuals and institutions whose power and comfort depend on the status quo These prison guards of the past will strangle every innovation that threatens to change the way things have always been done if we let them      **Phased Arrays for Radio Astronomy, Remote Sensing, and Satellite Communications** Karl F. Warnick, Rob Maaskant, Marianna V. Ivashina, David B. Davidson, Brian D. Jeffs, 2018-07-26 Discover a modern approach to the analysis modeling and design of high sensitivity phased arrays Network theory numerical methods and computational electromagnetic simulation techniques are uniquely combined to enable full system analysis and design optimization Beamforming and array signal processing theory are integrated into the treatment from the start Digital signal processing methods such as polyphase filtering and RFI mitigation are described along with technologies for real time hardware implementation Key concepts from interferometric imaging used in radio telescopes are also considered A basic development of theory and modeling techniques is accompanied by problem sets that guide readers in developing modeling codes that retain the simplicity of the classical array factor method while incorporating mutual coupling effects and interactions between elements Combining current research trends with pedagogical material suitable for a first year graduate course this is an invaluable resource for students teachers researchers and practicing RF microwave and antenna design engineers      Creativity in Intelligent Technologies and Data Science Alla Kravets, Maxim Shcherbakov, Marina Kultsova, Olga Shabalina, 2015-09-11 This book constitutes the refereed proceedings of the First Conference on Creativity in Intelligent Technologies and Data Science CIT knowledge discovery in patent and open sources for creative tasks software computer aided design and agent based systems conceptual cognitive and qualitative modeling with application in intelligent decision making design creativity in CAD CAM CAE PDM intelligent decision support for continual improvement process data science in energy management transportation and urban development data science in social networks analysis natural language and image processing and analysis game based learning technologies in engineering education and educational games design personalized learning in Web based intelligent



educational systems e inclusion development of smart mobile applications for people with disabilities      **Governance**

**Feminism** Janet Halley, Prabha Kotiswaran, Rachel Rebouché, Hila Shamir, 2019-03-26 An interdisciplinary multifaceted look at feminist engagements with governance across the global North and global South Governance Feminism Notes from the Field brings together nineteen chapters from leading feminist scholars and activists to critically describe and assess contemporary feminist engagements with state and state like power Gathering examples from North America South America Europe Asia and the Middle East it complements and expands on the companion volume Governance Feminism An Introduction Its chapters argue that governance feminism GF is institutionally diverse and globally distributed emerging from traditional sites of state power as well as from various forms of governance and operating at the grassroots level in the private sector in civil society and in international relations The book begins by confronting the key role that crime and punishment play in GFeminist projects Here contributors explore the ideological and political conditions under which this branch of GF became so robust and rethink the carceral turn Other chapters speak to another face of GFeminism feminists finding in mundane and seemingly unspectacular bureaucratic tools leverage to bring about change in policy and governance practices Several contributions highlight the political strategic and ethical challenges that feminists and LGBT activists must negotiate to play on the governmental field The book concludes with a focus on feminist interventions in postcolonial legal and political orders looking at new policy spaces opened up by conflict postconflict and occupation Providing a clear cross cutting critical lens through which to map developments in feminist governance around the world Governance Feminism Notes from the Field makes sense of the costs and benefits of current feminist realities to reimagine feminist futures Contributors Libby Adler Northeastern U Aziza Ahmed Northeastern U Elizabeth Bernstein Barnard College Amy J Cohen Ohio State U Karen Engle U of Texas at Austin Jacob Gersen Harvard U Leigh Goodmark U of Maryland Aeyal Gross Tel Aviv U Aya Gruber U of Colorado Boulder Janet Halley Harvard U Rema Hammami Birzeit U Palestine Vanja Hamzi U of London Isabel Cristina Jaramillo Sierra Prabha Kotiswaran King s College London Maleiha Malik King s College London Vasuki Nesiah New York U Dianne Otto Melbourne Law School Helen Reece Darren Rosenblum Pace U Jeannie Suk Gersen Harvard U Mariana Valverde U of Toronto      **The Age of Radiance** Craig Nelson, 2014-12-30 A riveting narrative of the Atomic Age from X rays and Marie Curie to the Nevada Test Site and the 2011 meltdown in Japan written by the prizewinning and bestselling author of Rocket Men Radiation is a complex and paradoxical concept staggering amounts of energy flow from seemingly inert rock and that energy is both useful and dangerous While nuclear energy affects our everyday lives from nuclear medicine and food irradiation to microwave technology its invisible rays trigger biological damage birth defects and cellular mayhem Written with a biographer s passion Craig Nelson unlocks one of the great mysteries of the universe in a work that is both tragic and triumphant From the end of the nineteenth century through the use of the atomic bomb in World War II to the twenty first century s confrontation with the dangers of nuclear power Nelson illuminates a pageant of

fascinating historical figures Enrico Fermi Marie and Pierre Curie Albert Einstein FDR Robert Oppenheimer and Ronald Reagan among others He reveals many little known details including how Jewish refugees fleeing Hitler transformed America from a country that created light bulbs and telephones into one that split atoms how the most grotesque weapon ever invented could realize Alfred Nobel's lifelong dream of global peace how emergency workers and low level utility employees fought to contain a run amok nuclear reactor while wondering if they would live or die Brilliantly fascinating and remarkably accessible *The Age of Radiance* traces mankind's complicated and difficult relationship with the dangerous power it discovered and made part of civilization Publisher information     *The Soul of Genius* Jeffrey Orens, 2021-07-06 A prismatic look at the meeting of Marie Curie and Albert Einstein and the impact these two pillars of science had on the world of physics which was in turmoil In 1911 some of the greatest minds in science convened at the First Solvay Conference in Physics a meeting like no other Almost half of the attendees had won or would go on to win the Nobel Prize Over the course of those few days these minds began to realize that classical physics was about to give way to quantum theory a seismic shift in our history and how we understand not just our world but the universe At the center of this meeting were Marie Curie and a young Albert Einstein In the years preceding Curie had faced the death of her husband and soul mate Pierre She was on the cusp of being awarded her second Nobel Prize but scandal erupted all around her when the French press revealed that she was having an affair with a fellow scientist Paul Langevin The subject of vicious misogynist and xenophobic attacks in the French press Curie found herself in a storm that threatened her scientific legacy Albert Einstein proved an supporter in her travails They had an instant connection at Solvay He was young and already showing flourishes of his enormous genius Curie had been responsible for one of the greatest discoveries in modern science radioactivity but still faced resistance and scorn Einstein recognized this grave injustice and their mutual admiration and respect borne out of this their first meeting would go on to serve them in their paths forward to making history Curie and Einstein come alive as the complex people they were in the pages of *The Soul of Genius* Utilizing never before seen correspondance and notes Jeffrey Orens reveals the human side of these brilliant scientists one who pushed boundaries and demanded equality in a man's world no matter the cost and the other who was destined to become synonymous with genius     *Carbon Capture and Storage* Ian Havercroft, Richard Macrory Hon KC, Richard Stewart, 2018-02-08 Carbon Capture and Storage CCS is increasingly viewed as one of the most significant ways of dealing with greenhouse gas emissions Critical to realising its potential will be the design of effective legal regimes at national and international level that can handle the challenges raised but without stifling a new technology of potential great public benefit These include long term liability for storage regulation of transport the treatment of stored carbon under emissions trading regimes issues of property ownership and increasingly the sensitivities of handling the public engagement and perception Following its publication in 2011 *Carbon Capture and Storage* quickly became required reading for all those interested in or engaged by the need to implement regulatory approaches to CCS The intervening years have

seen significant developments globally Earlier legislative models are now in force providing important lessons for future legal design Despite these developments the growth of the technology has been slower in some jurisdictions than others This timely new edition will update and critically assess these updates and provide context for the development of CCS in 2018 and beyond

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