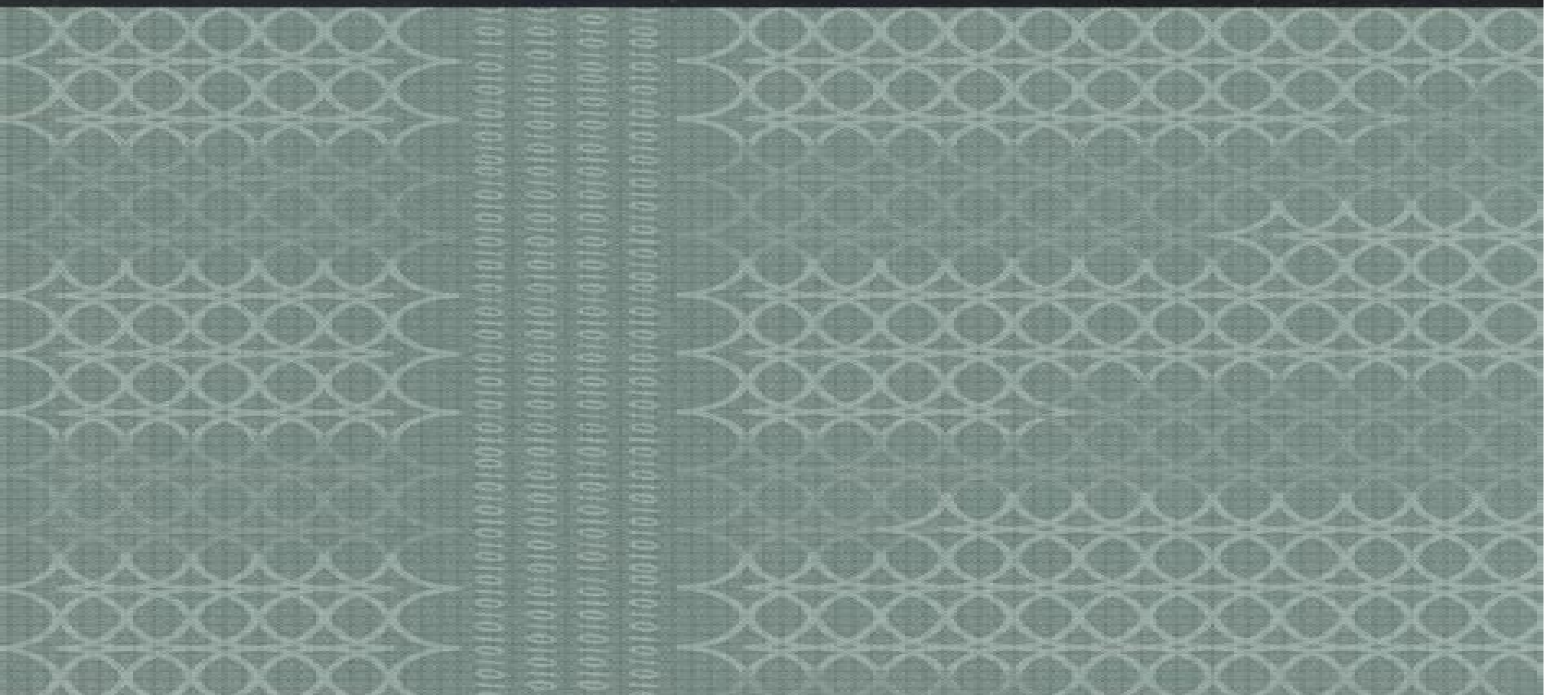


REALIZING THE POTENTIAL OF C4I

FUNDAMENTAL CHALLENGES



COMPUTER SCIENCE AND TELECOMMUNICATIONS BOARD
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Realizing The Potential Of C4i Fundamental Challenges:

Realizing the Potential of C4I National Research Council, Division on Engineering and Physical Sciences, Computer Science and Telecommunications Board, Commission on Physical Sciences, Mathematics, and Applications, Committee to Review DOD C4I Plans and Programs, 1999-05-17 Rapid progress in information and communications technologies is dramatically enhancing the strategic role of information positioning effective exploitation of these technology advances as a critical success factor in military affairs These technology advances are drivers and enablers for the nervous system of the military its command control communications computers and intelligence C4I systems to more effectively use the muscle side of the military Authored by a committee of experts drawn equally from the military and commercial sectors Realizing the Potential of C4I identifies three major areas as fundamental challenges to the full Department of Defense DOD exploitation of C4I technology information systems security interoperability and various aspects of DOD process and culture The book details principles by which to assess DOD efforts in these areas over the long term and provides specific more immediately actionable recommendations Although DOD is the focus of this book the principles and issues presented are also relevant to interoperability architecture and security challenges faced by government as a whole and by large complex public and private enterprises across the economy

Realizing the Potential of C4I: Fundamental Challenges, 1999 Section 262 of the Defense Authorization Act for Fiscal Year 1996 directed the Secretary of Defense to request that the National Research Council conduct a review of current and planned service and defense wide programs for command control communications computers and intelligence C4I with a special focus on cross service and inter service issues For purposes of this report C4I systems include systems designed to support a commander's exercise of command and control across the range of military operations and to generate information and knowledge about an adversary and friendly forces Although the Cold War is over new regional threats to U S interests are increasingly likely The U S military in its traditional role as an instrument of national power will be required to deal with a more varied set of military tasks and missions helping to both establish and maintain regional peace and stability and also coping with less traditional tasks such as humanitarian relief and disaster recovery Budget pressures have already resulted in a significantly reduced force structure and withdrawal of U S military presence from many overseas locations Joint operations are now the norm and in many cases U S military operations are combined with those of allied and coalition forces Forces responding to contingencies are likely to be employed come as they are with only minimal time for preparation and deployment before entering the operational phase of a contingency The military that must play these roles has many different C4I systems both old and new Older systems often were built for single purpose stand alone applications and often rely heavily on military specific technology In contrast current systems are increasingly being built to meet explicit requirements for interoperability and flexibility and the Department of Defense has been increasingly capitalizing on commercial information technologies for C4I systems

Realizing the Potential of C4I

Committee to Review DOD C4I Plans and Programs, Commission on Physical Sciences, Mathematics, and Applications, Computer Science and Telecommunications Board, Division on Engineering and Physical Sciences, National Research Council, 1999-05-31 Rapid progress in information and communications technologies is dramatically enhancing the strategic role of information positioning effective exploitation of these technology advances as a critical success factor in military affairs These technology advances are drivers and enablers for the nervous system of the military its command control communications computers and intelligence C4I systems to more effectively use the muscle side of the military Authored by a committee of experts drawn equally from the military and commercial sectors Realizing the Potential of C4I identifies three major areas as fundamental challenges to the full Department of Defense DOD exploitation of C4I technology information systems security interoperability and various aspects of DOD process and culture The book details principles by which to assess DOD efforts in these areas over the long term and provides specific more immediately actionable recommendations Although DOD is the focus of this book the principles and issues presented are also relevant to interoperability architecture and security challenges faced by government as a whole and by large complex public and private enterprises across the economy

A Review of the FBI's Trilogy Information Technology Modernization Program National Research Council, Division on Engineering and Physical Sciences, Computer Science and Telecommunications Board, Committee on the FBI's Trilogy Information Technology Modernization Program, 2004-06-10 The Federal Bureau of Investigation FBI is in the process of developing a modern information technology IT system the Trilogy program that is designed to provide a high speed network modern workstations and software and an application the Virtual Case File VCF to enhance the ability of agents to organize access and analyze information Implementation of this system has encountered substantial difficulties however and has been the subject of much investigation and congressional concern To help address these problems the FBI asked the National Research Council NRC to undertake a quick review of the program and the progress that has been made to date This report presents that review The current status of four major aspects of the program the enterprise architecture system design program management and human resources are discussed and recommendations are presented to address the problems

Cybersecurity Today and Tomorrow National Research Council, Division on Engineering and Physical Sciences, Computer Science and Telecommunications Board, 2002-04-12 This report reviews past NRC studies that have examined various dimensions of computer and network security and vulnerability and brings the results forward into the context of the current environment of security and vulnerability The review includes work done since 1991 such as Computers at Risk 1991 Cryptography's Role in Securing the Information Society 1996 For the Record Protecting Electronic Health Information 1997 Trust in Cyberspace 1999 Continued Review of the Tax Systems Modernization of the Internal Revenue Service 1996 Realizing the Potential of C4I 1999 and Embedded Everywhere 2001

Trillions for Military Technology J. Alic, 2007-09-03 Trillions for Military Technology explains why the weapons purchased

by the U S Department of Defense cost so much why it takes decades to get them into production even as innovation in the civilian economy becomes ever more frenetic and why some of those weapons don t work very well despite expenditures of many billions of dollars It also explains what do about these problems The author argues that the internal politics of the armed services make weapons acquisition almost unmanageable Solutions require empowering civilian officials and reforms that will bring choice of weapons into the sunshine of public debate Crisis Management: Concepts, Methodologies, Tools, and Applications Management Association, Information Resources,2013-11-30 This book explores the latest empirical research and best real world practices for preventing weathering and recovering from disasters such as earthquakes or tsunamis to nuclear disasters and cyber terrorism Provided by publisher **State Voter Registration Databases** National Research Council,Division on Engineering and Physical Sciences,Computer Science and Telecommunications Board,Committee on State Voter Registration Databases,2008-05-17 The Help America Vote Act of 2002 requires the states to develop a single computerized voter registration data base VRD that is defined maintained and administered at the state level To help the states with this task the U S Election Assistance Commission asked the NRC to organize a series of workshops and prepare an interim report addressing the challenges in implementing and maintaining state VRDs The EAC also asked the NRC to advise the states on how to evolve and maintain the databases so that they can share information with each other This report provides an examination of various challenges to the deployment of state VRDs and describes potential solutions to these challenges This interim report s primary focus is on shorter term recommendations although a number of long range recommendations are presented The final report will elaborate on the long range questions and address considerations about interstate interoperability of the VRDs **Unmanned Aircraft Systems** Ella Atkins,Anibal Ollero,Antonios Tsourdos,2017-01-17 UNMANNED AIRCRAFT SYSTEMS UNMANNED AIRCRAFT SYSTEMS An unmanned aircraft system UAS sometimes called a drone is an aircraft without a human pilot on board instead the UAS can be controlled by an operator station on the ground or may be autonomous in operation UAS are capable of addressing a broad range of applications in diverse complex environments Traditionally employed in mainly military applications recent regulatory changes around the world are leading to an explosion of interest and wide ranging new applications for UAS in civil airspace Covering the design development operation and mission profiles of unmanned aircraft systems this single comprehensive volume forms a complete stand alone reference on the topic The volume integrates with the online Wiley Encyclopedia of Aerospace Engineering providing many new and updated articles for existing subscribers to that work The chapters cover the following items Airframe configurations and design launch systems power generation propulsion Operations missions integration issues and airspace access Coordination multivehicle cooperation and human oversight With contributions from leading experts this volume is intended to be a valuable addition and a useful resource for aerospace manufacturers and suppliers governmental and industrial aerospace research establishments airline and aviation industries

university engineering and science departments and industry analysts consultants and researchers *Improving State Voter Registration Databases* National Research Council, Division on Engineering and Physical Sciences, Computer Science and Telecommunications Board, Committee on State Voter Registration Databases, 2010-02-26 Improving State Voter Registration Databases outlines several actions that are needed to help make voter registration databases capable of sharing information within state agencies and across state lines These include short term changes to improve education dissemination of information and administrative processes and long term changes to make improvements in data collection and entry matching procedures and ensure privacy and security *Information Technology for Counterterrorism* National Research Council, Division on Engineering and Physical Sciences, Computer Science and Telecommunications Board, Committee on the Role of Information Technology in Responding to Terrorism, 2003-04-07 Information technology IT is essential to virtually all of the nation's critical infrastructures making them vulnerable by a terrorist attack on their IT system An attack could be on the system itself or use the IT system to launch or exacerbate another type of attack IT can also be used as a counterterrorism tool The report concludes that the most devastating consequences of a terrorist attack would occur if it were on or used IT as part of a broader attack The report presents two recommendations on what can be done in the short term to protect the nation's communications and information systems and several recommendations about what can be done over the longer term The report also notes the importance of considering how an IT system will be deployed to maximize protection against and usefulness in responding to attacks *Science and Technology to Combat Terrorism* United States. Congress. House. Committee on Science, 2002 **Making the Nation Safer** National Research Council, Division on Engineering and Physical Sciences, Committee on Science and Technology for Countering Terrorism, 2002-10-05 Vulnerabilities abound in U S society The openness and efficiency of our key infrastructures transportation information and telecommunications systems health systems the electric power grid emergency response units food and water supplies and others make them susceptible to terrorist attacks Making the Nation Safer discusses technical approaches to mitigating these vulnerabilities A broad range of topics are covered in this book including Nuclear and radiological threats such as improvised nuclear devices and dirty bombs Bioterrorism medical research agricultural systems and public health Toxic chemicals and explosive materials Information technology such as communications systems data management cyber attacks and identification and authentication systems Energy systems such as the electrical power grid and oil and natural gas systems Transportation systems Cities and fixed infrastructures such as buildings emergency operations centers and tunnels The response of people to terrorism such as how quality of life and morale of the population can be a target of terrorists and how people respond to terrorist attacks and Linked infrastructures i e the vulnerabilities that result from the interdependencies of key systems In each of these areas there are recommendations on how to immediately apply existing knowledge and technology to make the nation safer and on starting research and development programs that could produce

innovations that will strengthen key systems and protect us against future threats The book also discusses issues affecting the government's ability to carry out the necessary science and engineering programs and the important role of industry universities and states counties and cities in homeland security efforts A long term commitment to homeland security is necessary to make the nation safer and this book lays out a roadmap of how science and engineering can assist in countering terrorism

Right To National Self-Defense Dimitrios Delibasis, 2007-11-19 This ambitious work which took the better part of a decade to produce will be essential reading for all serious defence study students and of absorbing interest to military professionals and lay people concerned with the future of warfare and all aspects of response to military attack Its ultimate aim is to demonstrate that the advent of Cyberwarfare has pushed traditional legal thinking regarding the regulation of forcible action beyond traditional boundaries It attempts to do so by critically analyzing specific characteristics which are inherent to Cyberwarfare such as stealth speed untraceability the availability to State as well as Non State sponsored agents their defiance of traditional borders and an unprecedented potential for destruction all of which have played a major role in making obsolescent traditional legal norms relied upon for the effective regulation of the use of force It follows from the above that no defence system can be effectively regulated especially one as new and unconventional as Information Warfare unless all its specific aspects are explored as deeply as possible The best means to achieve such a purpose have been deemed to be through the inclusion as well as the careful analysis of as many real life examples of Information Warfare operations as possible in order to illustrate the special nature of Information Warfare and its various individual features The examples compiled for inclusion have been selected not on the basis of being the most recent but on the basis of their factual background being as fully known as possible Consequently this book has been constructed around the concept of legality starting with a section outlining currently existing legal norms of individual self defense then applying those norms to Information Warfare Operations including a presentation of existing international legal instruments with provisions applicable to Information Warfare which could serve as additional essential guidelines for a future legal framework specifically crafted to regulate the use of force in cyberspace Last but not least this book sets a paradigm with regard to Cyberwarfare as well as with other methods of warfare which escape the boundaries of the traditional State monopoly of the use of force It ultimately shows the extent to which traditional legal thinking which is shaped around the premise of regulating typical forms of State forcible action when faced with such methods of warfare is totally obsolete

Preparing the U.S. Army for Homeland Security Eric V. Larson, John E. Peters, 2001-03-26 Homeland security encompasses five distinct missions domestic preparedness and civil support in case of attacks on civilians continuity of government continuity of military operations border and coastal defense and national missile defense This report extensively details four of those mission areas national missile defense having been covered in great detail elsewhere The authors define homeland security and its mission areas provide a methodology for assessing homeland security response options and

review relevant trend data for each mission area. They also assess the adequacy of the doctrine, organizations, training, leadership, materiel, and soldier systems and provide illustrative scenarios to help clarify Army planning priorities. The report concludes with options and recommendations for developing more cost-effective programs and recommends a planning framework that can facilitate planning to meet homeland security needs.

US Military Innovation Since the Cold War Harvey Sapolsky, Benjamin Friedman, Brendan Green, 2009-04-28. This book explains how the US military reacted to the Revolution in Military Affairs (RMA) and failed to innovate its organization or doctrine to match the technological breakthroughs it brought about. Many called for the transformation of the US military in the years after the end of the Cold War, seeking the changes in organization and doctrine that would complete the RMA innovation and a commitment to counter insurgency, peacekeeping, and nation-building missions. This volume describes the origins, uses, and limits of the RMA technologies, examines how each of the five US armed services, categorising the Special Operations as a separate service, made their adjustments both to the technologies and the use of force, and how the role of the civilian officials and the defense industry altered in this process of change and avoidance of change. The book examines the internal politics of the services as well as civil-military relations to identify the external pressures on the services for significant change in their doctrine and weapons. Many have noted the failure of the services to innovate in what can be called the Second Inter-war Period, the years after the Cold War. This book offers explanations for this failure and arguments about the possible range and desirability of military innovation in the post-Cold War era. This book will be of great interest to students of strategic studies, US defence politics, military studies, and US politics. Harvey M. Sapolsky is Professor of Public Policy and Organization in the Department of Political Science at MIT and former Director of the Security Studies Program. Benjamin H. Friedman is a Research Fellow in Defense and Homeland Security Studies at the Cato Institute and a Ph.D. Candidate in Political Science at MIT. Brendan Green is a Ph.D. Candidate in Political Science at MIT and an affiliate of the Security Studies Program.

Avoiding Surprise in an Era of Global Technology Advances National Research Council, Division on Engineering and Physical Sciences, Committee on Defense Intelligence Agency Technology Forecasts and Reviews, 2005-05-31. The global spread of science and technology expertise and the growing commercial access to advanced technologies with possible military application are creating potentially serious threats to the technological superiority underpinning US military strength. Key to dealing with this situation is the ability of the US intelligence community to be able to provide adequate and effective warning of evolving critical technologies. To assist in performing this task, the Technology Warning Division of the Defense Intelligence Agency (DIA) asked the National Research Council (NRC) to undertake a study examining technology warning issues. This report provides the first part of that study. It presents an assessment of critical evolving technologies, postulates ways potential adversaries could disrupt these technologies, and provides indicators for the intelligence community to determine if such methods are under development. The intention of this report is to establish the foundation for a long-term

relationship with the technology warning community to support the examination of technology warning issues *Astride Two Worlds* Barton C. Hacker, 2016-05-03 By the middle of the nineteenth century industrialization and military technological innovation were beginning to alter drastically the character and conditions of warfare as it had been conducted for centuries Occurring in the midst of these far reaching changes the American Civil War can justly be labeled both the last great preindustrial war and the first major war of the industrial age Industrial capacity attained new levels of military significance as transportation improved but in this as in many other respects the Civil War was distinctly transitional Smoothbore artillery still dominated the battlefield horse drawn wagons and pack mules still carried the main logistic burden seamstresses still outnumbered sewing machine operators *Astride Two Worlds* addresses the various causes and consequences of technological change for the course and outcome of the American Civil War *Toward a Safer and More Secure Cyberspace* National Academy of Engineering, National Research Council, Division on Engineering and Physical Sciences, Computer Science and Telecommunications Board, Committee on Improving Cybersecurity Research in the United States, 2007-11-24 Given the growing importance of cyberspace to nearly all aspects of national life a secure cyberspace is vitally important to the nation but cyberspace is far from secure today The United States faces the real risk that adversaries will exploit vulnerabilities in the nation's critical information systems thereby causing considerable suffering and damage Online e commerce business government agency files and identity records are all potential security targets *Toward a Safer and More Secure Cyberspace* examines these Internet security vulnerabilities and offers a strategy for future research aimed at countering cyber attacks It also explores the nature of online threats and some of the reasons why past research for improving cybersecurity has had less impact than anticipated and considers the human resource base needed to advance the cybersecurity research agenda This book will be an invaluable resource for Internet security professionals information technologists policy makers data stewards e commerce providers consumer protection advocates and others interested in digital security and safety

Cyberspace and National Security Derek S. Reveron, 2012-09-11 In a very short time individuals and companies have harnessed cyberspace to create new industries a vibrant social space and a new economic sphere that are intertwined with our everyday lives At the same time individuals subnational groups and governments are using cyberspace to advance interests through malicious activity Terrorists recruit train and target through the Internet hackers steal data and intelligence services conduct espionage Still the vast majority of cyberspace is civilian space used by individuals businesses and governments for legitimate purposes *Cyberspace and National Security* brings together scholars policy analysts and information technology executives to examine current and future threats to cyberspace They discuss various approaches to advance and defend national interests contrast the US approach with European Russian and Chinese approaches and offer new ways and means to defend interests in cyberspace and develop offensive capabilities to compete there Policymakers and strategists will find this book to be an invaluable resource in their efforts to ensure national security and answer concerns

about future cyberwarfare

Realizing The Potential Of C4i Fundamental Challenges Book Review: Unveiling the Power of Words

In a global driven by information and connectivity, the ability of words has become more evident than ever. They have the capacity to inspire, provoke, and ignite change. Such may be the essence of the book **Realizing The Potential Of C4i Fundamental Challenges**, a literary masterpiece that delves deep into the significance of words and their affect our lives. Written by a renowned author, this captivating work takes readers on a transformative journey, unraveling the secrets and potential behind every word. In this review, we shall explore the book is key themes, examine its writing style, and analyze its overall affect readers.

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for the nitration 4.01 ml of nitric acid 4.00 ml of sulfuric acid and 4.56 ml bromobenzene were used to complete the reaction with these measurements bromobenzene was found to be the limiting reagent since only 4.56 ml of bromobenzene was used the amount of product predicted to be recovered was 8.7533 g

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in this experiment we will carry out the nitration of bromobenzene bromine substituted on an aromatic ring is an ortho para directing group it will direct an incoming electrophile to the ortho and para positions it is also deactivating meaning that its reactions will be slower than the identical reactions of benzene

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section 20711 lab experiment nitration of bromobenzene introduction the chemical reaction of nitration consists of a nitro group being added to or substituted in a molecule nitration can basically be carried out by a mixture of concentrated nitric acid and sulfuric acid this mixture is useful to obtain the active nitronium ion

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the soap in the lab is not suitable for this purpose 2 return to the lab and apply mineral oil to the affected area theory and explanation of the nitration of bromobenzene if the temperature of the reaction mixture exceeds 60 o

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the bromine substituent in bromobenzene is an ortho para director the para position is favored due to steric effects in the reaction that takes place in this lab a nitro group is substituted onto bromobenzene at the para position to form 1 bromo 4 nitrobenzene

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over 5 minutes slowly pipet this bromobenzene into the icy cold nitration mixture hno 3 h 2 so 4 in the 125 ml flask and stir continue to stir the reaction mixture in the ice bath for 30 minutes do not heat in a new 250 ml erlenmeyer

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on the right the arenium cation has a nitro set with incredibly small 0.6 angstrom bond distances this will result in an

optimization failure as the atoms are even close for the programme to accomodate their electrons demonstration of creating the p arenium cation by to nitration of bromobenzene

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the purpose of this lab was to observe where substituents are added on a benzene ring by way of electrophilic aromatic substitution the electrophilic source in the nitration of bromobenzene comes from a nitronium ion NO_2^+ which acts as the electrophilic species

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mixture of sulfuric acid or nitric acid creates what is known as a nitro group

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