

UNIT-I:

**PROBLEM 1.2 (P-1.25)** Calculate the specific electric and magnetic loading of 100HP, 3000V, 3 $\phi$ , 50Hz, 8 pole, star connected flame proof induction motor having stator core length 0.5m and stator bore 0.66m. Turns/phase=286. Assume full load efficiency=0.938 and power factor=0.86. [ DEC-2013 (8 mark) ]

**Problem Model - I**

**GIVEN:**  $P = 100 \times 0.746 = 74.6 \text{ kW}$ ,  $f = 50 \text{ Hz}$ ,  $p = 8$ ,  $D = 0.66 \text{ m}$ ,  $L = 0.5 \text{ m}$ ,  $V_L = 3000 \text{ V}$

$$V_{ph} = \frac{V_L}{\sqrt{3}} = 1732.05 \text{ V} \quad \eta = 0.938, \quad T_{ph} = 286 \quad \cos \phi = 0.86 \quad ac? \quad B_{av}?$$

**Soln:**

**step 1: find  $I_2$**

current passing

$$I_2 = I_1 = I_{ph} = \frac{P \times 10^3}{\sqrt{3} V_L \eta \cos \phi}$$

$$= 17.79 \text{ A}$$

through each conductor

**step 2: find ac -  $T_{ph}$  given**

$$\text{spec. ac electric loading} = \frac{I_2 \cdot Z}{\pi \cdot D}$$

$$= 14730.57 \text{ amp/m cond}$$

**step 3: find  $\phi$**

$$\text{Flux per pole } \phi = \frac{F_s}{4.44 f k_{ws} T_{ph}}$$

$$= 0.028 \text{ Wb}$$

**step 4: find  $B_{av}$**

spec. magnetic loading

$$B_{av} = \frac{p \phi}{\pi D L}$$

$$= 0.216 \text{ Wb/m}^2$$

**PROBLEM 1.1 (P-1.23)** A 400KW, 500V, 450 rpm, 6 pole DC generator is built with an armature diameter of 0.87m and core length is 0.32m. The lap wound has 660 conductors. Calculate the specific electric loading and magnetic loading.

**GIVEN:**

$P = 400 \text{ kW} = 400 \times 1000 \text{ watts}$ ,  $V = 500 \text{ V}$ ,  $N = 450 \text{ rpm}$ ,  $p = 6$ ,  $D = 0.87 \text{ m}$ ,  $L = 0.32 \text{ m}$ ,  $Z = 660 \text{ conductors}$ ,  $a = p = 6$

**step 1: find  $I_2$**

current passing through each conductor

$$I_2 = \frac{I_a}{a}$$

$$I_a = \frac{P_a}{V} = 800 \text{ A}$$

$$I_2 = 133.33 \text{ A}$$

**step 2: find ac:**

$$\text{spec. electric loading ac} = \frac{I_2 \cdot Z}{\pi \cdot D}$$

$$= 32196.8 \text{ ampcond/m}$$

**step 3: find  $\phi$ :**

$$F_b = \frac{\phi Z N p}{60 a}$$

$$\phi = \frac{F_b \times 60 \times a}{Z N p}$$

$$\phi = 0.101 \text{ Wb}$$

**step 4: find  $B_{av}$ :**

spec. magnetic loading

$$B_{av} = \frac{p \phi}{\pi D L}$$

$$= 0.6928 \text{ Wb/m}^2$$

# Machine Design Problems And Solutions

**Shahin S. Nudehi, John R. Steffen**



## **Machine Design Problems And Solutions :**

**Mechanics of Machines** Mr. Rohit Manglik, 2024-05-17 EduGorilla Publication is a trusted name in the education sector committed to empowering learners with high quality study materials and resources Specializing in competitive exams and academic support EduGorilla provides comprehensive and well structured content tailored to meet the needs of students across various streams and levels

**Analysis of Machine Elements Using SOLIDWORKS Simulation 2015** Shahin Nudehi, John Steffen, 2015-04 Analysis of Machine Elements Using SOLIDWORKS Simulation 2015 is written primarily for first time SOLIDWORKS Simulation 2015 users who wish to understand finite element analysis capabilities applicable to stress analysis of mechanical elements The focus of examples is on problems commonly found in an introductory undergraduate Design of Machine Elements or similarly named courses In order to be compatible with most machine design textbooks this text begins with problems that can be solved with a basic understanding of mechanics of materials Problem types quickly migrate to include states of stress found in more specialized situations common to a design of mechanical elements course Paralleling this progression of problem types each chapter introduces new software concepts and capabilities Many examples are accompanied by problem solutions based on use of classical equations for stress determination Unlike many step by step user guides that only list a succession of steps which if followed correctly lead to successful solution of a problem this text attempts to provide insight into why each step is performed This approach amplifies two fundamental tenets of this text The first is that a better understanding of course topics related to stress determination is realized when classical methods and finite element solutions are considered together The second tenet is that finite element solutions should always be verified by checking whether by classical stress equations or experimentation Each chapter begins with a list of learning objectives related to specific capabilities of the SolidWorks Simulation program introduced in that chapter Most software capabilities are repeated in subsequent examples so that users gain familiarity with their purpose and are capable of using them in future problems All end of chapter problems are accompanied by evaluation check sheets to facilitate grading assignments

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**Analysis of Machine Elements Using SOLIDWORKS Simulation 2024** Shahin S. Nudehi, John R. Steffen, Designed for first time SOLIDWORKS Simulation users Focuses on examples commonly found in Design of Machine Elements courses Many problems are accompanied by solutions using classical equations Combines step by step tutorials with detailed explanations of why each step is taken Analysis of Machine Elements Using SOLIDWORKS Simulation 2024 is written primarily for first time SOLIDWORKS Simulation 2024 users who wish to understand finite element analysis capabilities applicable to stress analysis of mechanical elements The focus of examples is on problems commonly found in introductory undergraduate Design of Machine Elements or similarly named courses In order to be compatible with most machine design textbooks this text begins with problems that can be solved with a basic understanding of mechanics of materials Problem types quickly migrate to include states of stress found in more specialized situations common to a design of mechanical elements course Paralleling this progression of problem types each chapter introduces new software concepts and capabilities Many examples are accompanied by problem solutions based on use of classical equations for stress determination Unlike many step by step user guides that only list a succession of steps which if followed correctly lead to successful solution of a problem this text attempts to provide insight into why each step is performed This approach amplifies two fundamental tenets of this text The first is that a better understanding of course topics related to stress determination is realized when classical methods and finite element solutions are considered together The second tenet is that finite element solutions should always be verified by checking whether by classical stress equations or experimentation Each chapter begins with a list of learning objectives related to specific capabilities of the SOLIDWORKS Simulation program introduced in that chapter Most software capabilities are repeated in subsequent examples so that users gain familiarity with their purpose and are capable of using them in future problems All end of chapter problems are accompanied by evaluation check sheets to facilitate grading assignments , Analysis of Machine Elements Using SOLIDWORKS Simulation 2021 Shahin S. Nudehi, John R. Steffen, 2021-07-03 Designed for first time SOLIDWORKS Simulation users Focuses on examples commonly found in Design of Machine Elements courses Many problems are accompanied by solutions using classical equations

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*Optimization and Control of Electrical Machines* Abdel Ghani Aissaoui, Ahmed Tahour, Ilhami Colak, 2018-07-18 Electrical machines are used in the process of energy conversion in the generation transmission and consumption of electric power In addition to this electrical machines are considered the main part of electrical drive systems Electrical machines are the subject of advanced research In the development of an electrical

machine the design of its different structures is very important This design ensures the robustness energy efficiency optimal cost and high reliability of the system Using advanced techniques of control and new technology products has brought electrical machines into their optimal functioning mode Different techniques of control can be applied depending on the goals considered The aim of this book is to present recent work on the design control and applications of electrical machines

**Analysis of Machine Elements Using SOLIDWORKS Simulation 2017** Shahin Nudehi, John Steffen, 2017-04-25

Analysis of Machine Elements Using SOLIDWORKS Simulation 2017 is written primarily for first time SOLIDWORKS Simulation 2017 users who wish to understand finite element analysis capabilities applicable to stress analysis of mechanical elements The focus of examples is on problems commonly found in an introductory undergraduate Design of Machine Elements or similarly named courses In order to be compatible with most machine design textbooks this text begins with problems that can be solved with a basic understanding of mechanics of materials Problem types quickly migrate to include states of stress found in more specialized situations common to a design of mechanical elements course Paralleling this progression of problem types each chapter introduces new software concepts and capabilities Many examples are accompanied by problem solutions based on use of classical equations for stress determination Unlike many step by step user guides that only list a succession of steps which if followed correctly lead to successful solution of a problem this text attempts to provide insight into why each step is performed This approach amplifies two fundamental tenets of this text The first is that a better understanding of course topics related to stress determination is realized when classical methods and finite element solutions are considered together The second tenet is that finite element solutions should always be verified by checking whether by classical stress equations or experimentation Each chapter begins with a list of learning objectives related to specific capabilities of the SOLIDWORKS Simulation program introduced in that chapter Most software capabilities are repeated in subsequent examples so that users gain familiarity with their purpose and are capable of using them in future problems All end of chapter problems are accompanied by evaluation check sheets to facilitate grading assignments

**Analysis of Machine Elements Using SOLIDWORKS Simulation 2022** Shahin S. Nudehi, John R. Steffen, 2022

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**Mechanical Design Optimization Using Advanced Optimization Techniques** R. Venkata Rao,Vimal J. Savsani,2012-01-15 Mechanical design includes an optimization process in which designers always consider objectives such as strength deflection weight wear corrosion etc depending on the requirements However design optimization for a complete mechanical assembly leads to a complicated objective function with a large number of design variables It is a good practice to apply optimization techniques for individual components or intermediate assemblies than a complete assembly Analytical or numerical methods for calculating the



extreme values of a function may perform well in many practical cases but may fail in more complex design situations In real design problems the number of design parameters can be very large and their influence on the value to be optimized the goal function can be very complicated having nonlinear character In these complex cases advanced optimization algorithms offer solutions to the problems because they find a solution near to the global optimum within reasonable time and computational costs Mechanical Design Optimization Using Advanced Optimization Techniques presents a comprehensive review on latest research and development trends for design optimization of mechanical elements and devices Using examples of various mechanical elements and devices the possibilities for design optimization with advanced optimization techniques are demonstrated Basic and advanced concepts of traditional and advanced optimization techniques are presented along with real case studies results of applications of the proposed techniques and the best optimization strategies to achieve best performance are highlighted Furthermore a novel advanced optimization method named teaching learning based optimization TLBO is presented in this book and this method shows better performance with less computational effort for the large scale problems Mechanical Design Optimization Using Advanced Optimization Techniques is intended for designers practitioners managers institutes involved in design related projects applied research workers academics and graduate students in mechanical and industrial engineering and will be useful to the industrial product designers for realizing a product as it presents new models and optimization techniques to make tasks easier logical efficient and effective

**Genetic Algorithms for Applied CAD Problems** Viktor M. Kureichik, Sergey P. Malioukov, Vladimir V.

Kureichik, Alexander S. Malioukov, 2009-07-09 New perspective technologies of genetic search and evolution simulation represent the kernel of this book The authors wanted to show how these technologies are used for practical problems solution This monograph is devoted to specialists of CAD intellectual information technologies in science biology economics sociology and others It may be used by post graduate students and students of specialties connected to the systems theory and system analysis methods information science optimization methods operations investigation and solution making

*Technical Drawing 101 with AutoCAD 2026* Ashleigh Congdon-Fuller, Antonio Ramirez, Douglas Smith, Blends technical drawing and an introduction to AutoCAD 2026 Includes mechanical architectural civil and electronic projects Extensive library of video instruction included with each book Drafting theory is incorporated throughout the text Designed to be used in a single semester instructor led course Each chapter contains key terms unit summaries review questions and drawing projects A lot rides on your choice of technical drawing textbook it could be the gateway leading students to a rewarding career or the foundation for an introductory class that fuels interest in a whole program Technical Drawing 101 with AutoCAD 2026 is both More than a traditional technical drawing textbook it uniquely teaches both the theory and fundamentals of technical drawing and the basics of Autodesk AutoCAD It covers topics ranging from the most basic such as making freehand multi view sketches of machine parts to the advanced such as creating an AutoCAD dimension style

containing the style settings defined by the ASME Y14.5 2009 Dimensioning and Tolerancing standard. But unlike the massive technical drawing reference texts on the market, *Technical Drawing 101 with AutoCAD* presents just the right mix of information and projects for an introductory one semester course including all the supporting materials needed by students and faculty. The authors distilled all the knowledge and experience gleaned from designing a successful AutoCAD program into this textbook to deliver the best training possible to students. Step by step activities, exercises, and projects interest and challenge learners. *Technical Drawing 101 with AutoCAD* begins with technical and multi view drawing basics. The CAD portion of the text incorporates drafting theory whenever possible and covers the basics of drawing setup, units, limits, and layers, the tools of the Draw, Modify, and Dimension toolbars, and the fundamentals of 3D modeling. By focusing on the fundamental building blocks of CAD, *Technical Drawing 101 with AutoCAD* provides a solid foundation for students going on to learn advanced CAD concepts and techniques such as annotative scaling, etc., in intermediate CAD courses. The included mechanical and architectural projects as well as new chapters on civil drafting and electronic drafting allow students to explore these possible career paths with the perfect amount of background information and designing tasks. Supplemental Materials: The *Technical Drawing 101 with AutoCAD* textbook and included student and instructor materials are a complete semester's curriculum. Instructors receive an instructor's manual, lecture materials, check prints of AutoCAD dwg files, prototype drawings for assignments, a syllabus, tests, quizzes, answer keys, and sketching and traditional drafting files in doc and PDF format. With the textbook, students gain access to an extensive library of video tutorials. They also receive AutoCAD prototype drawings for each CAD assignment, lettering practice sheets, and multi view sketching grid sheets in PDF format. Broad Appeal: Students taking introductory technical drawing classes usually have diverse career interests. Traditional technical drawing texts which focus solely on mechanical drawing projects hold little interest for these students, so *Technical Drawing 101 with AutoCAD* includes projects in which students create working drawings for a mechanical assembly as well as for an architectural project. Learners will master these topics with the same clear instruction and step by step process that is featured in the rest of the textbook. The newly added chapter on civil drafting touches on types of civil drawings, civil bearings, courses, and units, and concludes with a mortgage survey project. Another brand new chapter on electrical and electronics drafting explains the types of working drawings and graphics found in this field: circuits, symbols, and components, and schematic diagrams, followed by an FM tuner project. The inclusion of these chapters helps capture the interest of more students while adding even more multidisciplinary appeal to the text. Video Tutorials: The video tutorials that are included with this textbook are designed to get students comfortable with the user interface and demonstrate how to use many of AutoCAD's commands and features. The videos progress to more advanced topics that walk students through completing several of the projects in the book. Icons throughout the book alert learners to times when they should access downloads and videos.

**Technical Drawing 101 with AutoCAD 2014** Antonio Ramirez, Douglas W. Smith, Jana Schmidt, 2013 Technical

Drawing 101 covers topics ranging from the most basic such as making freehand multiview sketches of machine parts to the advanced creating an AutoCAD dimension style containing the style settings defined by the ASME Y14.5 2009 Dimensioning and Tolerancing standard. But unlike the massive technical drawing reference texts on the market, Technical Drawing 101 aims to present just the right mix of information and projects that can be reasonably covered by faculty and assimilated by students in one semester. Both mechanical and architectural projects are introduced to capture the interest of more students and to offer a broader appeal. The authors have also created video tutorials for this book in which they demonstrate how to use many of AutoCAD's tools and commands. The CAD portion of the text incorporates drafting theory whenever possible and covers the basics of drawing setup, units, limits, and layers; the tools of the Draw, Modify, and Dimension toolbars; and the fundamentals of 3D modeling. By focusing on the fundamental building blocks of CAD, Technical Drawing 101 provides a solid foundation for students going on to learn advanced CAD concepts and techniques: paper space, viewports, xrefs, annotative scaling, etc. in intermediate CAD courses. In recognition of the diverse career interests of our students, Technical Drawing 101 includes projects in which students create working drawings for a mechanical assembly as well as for an architectural project. We include architectural drawing because our experience has shown that many, if not most, first semester drafting students are interested in careers in the architectural design field and that a traditional technical drawing text which focuses solely on mechanical drawing projects holds little interest for these students. The multidisciplinary approach of this text and its supporting materials is intended to broaden the appeal of the curriculum and increase student interest, and it is hoped future enrollments.

**Technical Drawing 101 with AutoCAD 2017** Ashleigh Fuller, Antonio Ramirez, Douglas Smith, 2016-05

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*Technical Drawing 101 with AutoCAD 2019* Ashleigh Fuller,Douglas W. Smith,Antonio M. Ramirez,2018 Technical Drawing 101 covers topics ranging from the most basic such as making freehand multiview sketches of machine parts to the advanced creating an AutoCAD dimension style containing the style settings defined by the ASME Y14 5 2009 Dimensioning and Tolerancing standard But unlike the massive technical drawing reference texts on the market Technical Drawing 101 aims to present just the right mix of information and projects that can be reasonably covered by faculty and assimilated by students in one semester Both mechanical and architectural projects are introduced to capture the interest of more students and to offer a broader appeal The authors have also created extensive video training 120 videos 15 hours total that is included with every copy of the book In these videos the authors start off by getting students comfortable with the user interface and demonstrating how to use many of AutoCAD s commands and features The videos progress to more advanced topics where the authors walk students through completing several of the projects in the book The CAD portion of the text incorporates drafting theory whenever possible and covers the basics of drawing setup units limits and layers the tools of the Draw Modify and Dimension toolbars and the fundamentals of 3D modeling By focusing on the fundamental building blocks of CAD Technical Drawing 101 provides a solid foundation for students going on to learn advanced CAD concepts and techniques paper space viewports xrefs annotative scaling etc in intermediate CAD courses In recognition of the diverse career interests of our students Technical Drawing 101 includes projects in which students create working drawings for a mechanical assembly as well as for an architectural project We include architectural drawing because our experience has shown that many if not most first semester drafting students are interested in careers in the architectural design field and that a traditional technical drawing text which focuses solely on mechanical drawing projects holds little interest for these students The multidisciplinary approach of this text and its supporting materials are intended to broaden the appeal of the curriculum and increase student interest and it is hoped future enrollments

**Technical Drawing 101 with AutoCAD 2024** Ashleigh Congdon-Fuller,Antonio Ramirez,Douglas Smith,2023 Blends technical drawing and an introduction to AutoCAD 2024 Covers both mechanical and architectural projects Twenty six hours of video instruction is included with each book Drafting theory is incorporated throughout the text Designed to be used in a single semester instructor led course Each chapter contains key terms unit summaries review questions and drawing projects Technical Drawing 101 covers topics ranging from the most

basic such as making freehand multiview sketches of machine parts to the advanced creating an AutoCAD dimension style containing the style settings defined by the ASME Y14.5 2009 Dimensioning and Tolerancing standard. But unlike the massive technical drawing reference texts on the market, Technical Drawing 101 aims to present just the right mix of information and projects that can be reasonably covered by faculty and assimilated by students in one semester. Both mechanical and architectural projects are introduced to capture the interest of more students and to offer a broader appeal. The authors have also created extensive video training, 178 videos, 26 hours total, that is included with every copy of the book. In these videos, the authors start off by getting students comfortable with the user interface and demonstrating how to use many of AutoCAD's commands and features. The videos progress to more advanced topics where the authors walk students through completing several of the projects in the book. The CAD portion of the text incorporates drafting theory whenever possible and covers the basics of drawing setup, units, limits, and layers, the tools of the Draw, Modify, and Dimension toolbars, and the fundamentals of 3D modeling. By focusing on the fundamental building blocks of CAD, Technical Drawing 101 provides a solid foundation for students going on to learn advanced CAD concepts and techniques: paper space, viewports, xrefs, annotative scaling, etc., in intermediate CAD courses. In recognition of the diverse career interests of our students, Technical Drawing 101 includes projects in which students create working drawings for a mechanical assembly as well as for an architectural project. We include architectural drawing because our experience has shown that many, if not most, first semester drafting students are interested in careers in the architectural design field and that a traditional technical drawing text which focuses solely on mechanical drawing projects holds little interest for these students. The multidisciplinary approach of this text and its supporting materials are intended to broaden the appeal of the curriculum and increase student interest, and it is hoped future enrollments will reflect this.

Technical Drawing 101 with AutoCAD 2025 Ashleigh Congdon-Fuller, Douglas Smith, Antonio Ramirez, Blends technical drawing and an introduction to AutoCAD 2025. Includes mechanical, architectural, civil, and electronic projects. Extensive library of video instruction included with each book. Drafting theory is incorporated throughout the text. Designed to be used in a single semester instructor-led course. Each chapter contains key terms, unit summaries, review questions, and drawing projects. This edition features new chapters covering civil and electrical drafting. A lot rides on your choice of technical drawing textbook; it could be the gateway leading students to a rewarding career or the foundation for an introductory class that fuels interest in a whole program. Technical Drawing 101 with AutoCAD 2025 is both more than a traditional technical drawing textbook; it uniquely teaches both the theory and fundamentals of technical drawing and the basics of AutoCAD. It covers topics ranging from the most basic, such as making freehand multi-view sketches of machine parts to the advanced, such as creating an AutoCAD dimension style containing the style settings defined by the ASME Y14.5 2009 Dimensioning and Tolerancing standard. But unlike the massive technical drawing reference texts on the market, Technical Drawing 101 with AutoCAD presents just the right mix of information and projects for an introductory one.

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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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the aim of the experiment is to determine and study electrophilic aromatic substitution reaction eas particularly nitration of methyl benzoate go give methyl m nitrobenzoate thus determine the weight melting point and percentage yield of the pure methyl m nitrobenzoate abstract

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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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1 go to the restroom and wash the affected area with lots of soap and water the soap in the lab is not suitable for this purpose 2 return to the lab and apply mineral oil to the affected area 3 the summary to this warning is not to touch any part of your body while performing this experiment if you must leave the lab for any reason 1

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in the nitration of bromobenzene a mixture of sulfuric acid and nitric acid react with one another nitric acid the weaker of the two acids will serve as base to form nitronium ion bromobenzene will attack the nitronium ion by nucleophilic attack

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nitration of bromobenzene lab report improved essays 731 words 3 pages open document essay sample check writing quality show more this experiment was performed in order to demonstrate the principles of nitration through electrophilic aromatic substitution it also examined the effects of bromine on an aromatic ring ortho para vs meso directing

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then actual is your actual findings yield actual theoretical x 100 what are the possible side reactions of nitration of bromobenzene dinitration can occur at ortho para or at both ortho positions occurs in overheating meta product happens very rarely because bromine is an ortho para director

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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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study with quizlet and memorize flashcards containing terms like reacting sulfuric and nitric acid together produces the nitronium ion alone nitric acid is not a strong enough electrophile to react with bromobenzene sulfuric acid is added to the nitric acid the reverse rxn can overheat and boil easily includes a claisen adaptor and

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over 5 minutes slowly pipet this bromobenzene into the icy cold nitration mixture hno<sub>3</sub> h<sub>2</sub>so<sub>4</sub> 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<sub>2</sub><sup>+</sup> which acts as the electrophilic species

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nitration of bromobenzene is an electrophilic aromatic substitution reaction the electrophile will be formed from 4.0ml of nitric acid and 4.0ml of sulfuric acid and will then react with 4.5ml of bromobenzene this will produce o bromonitrobenzene and p bromonitrobenzene

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lab report 10 nitration of bromobenzene raekwon filmore cm 244 section 40 march 27 2018 introduction for this experiment

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