Minot State
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2018 Faculty and Students
Research Poster Session
April 26, 2018
Book of Abstracts

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The Annual Research Poster Session and Book of Abstracts is sponsored by the MSU Faculty Research Committee.

Edited by Mikhail M. Bobylev
Professor of Chemistry
Faculty Research Committee

2018 MSU Research Poster Session – Book of Abstracts

TABLE OF CONTENTS

1. SOCIAL BONDS AND ON-LINE VICTIMIZATION: UTILIZING HIRSCHI'S PERSPECTIVE IN EXPLAINING YOUTH ON-LINE VICTIMIZATION 1
   Hasan Buker, Margaret Flinn
   Department of Criminal Justice, Minot State University

2. TIME INTERVAL ANALYSIS OF CAFFEINE CONCENTRATION IN HUMAN SALIVA UTILIZING GC/MS 2
   Paige Clark, Annika Kraft, Brett Nespor, Shirley Cole-Harding, Naomi Winburn
   Division of Science – Chemistry, Minot State University

3. $(Ca_2(FeAl)O_5)$ BY X-RAY DIFFRACTION 3
   Paige Clark, Naomi Winburn, Ryan Winburn
   Division of Science – Chemistry, Minot State University

4. RAPID SYNTHESIS OF N-METHYL-N-(2-TRIFLUOROMETHYLBENZYL) FORMAMIDE 4
   Tiffany A. Dostert-Azzarello, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
   Division of Science – Chemistry, Minot State University

5. THE ROLE OF PARENTAL INVOLVEMENT IN MINORITY STUDENTS' ACCESS TO COLLEGE PREPARATORY PROGRAMS — AN INVESTIGATION IN THE TRIO UPWARD BOUND PROGRAM 5
   Ana Carolina Silva, Joseph R. Engler, Ph.D., NCSP
   Department of Addiction Studies, Psychology, and Social Work, Minot State University

6. CONTRASTING THE CORPORATE SOCIAL RESPONSIBILITY PERCEPTIONS OF GENERATION X'ERS 6
   Megan Fixen
   Business Administration, Minot State University

7. RAPID SYNTHESIS OF N-(10-CHLORO-9-ANTHRYLMETHYL)-N- METHYLFORMAMIDE 7
Jonathan R. Gooding, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

8. RAPID SYNTHESIS OF N-METHYL-N-(4-PHENYLBENZYL)FORMAMIDE 8
Michal Gudejko, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

9. WHAT MATTERS MOST? AN EXAMINATION OF VARIABLES RELATED TO STUDENT OUTCOMES 9
Ann Beste-Guldborg, PhD, MA, CCC/SLP; Mary Huston, MS CCC/SLP, Riddhi Thaker, BSc; Ankita Seal, BA; April Hatcher, BS; Victoria Della Zanna, BS, Minot State University

10. RAPID SYNTHESIS OF N-(9-ANTHRYLMETHYL)-N-METHYLFORMAMIDE 10
Kaytlyn H. Heick, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

11. RAPID SYNTHESIS OF N-METHYL-N-(4-NITROBENZYL)FORMAMIDE 11
Edjay Ralph A. Hernandez, Lioudmila I. Bobyleva, MS, and Mikhail Bobylev, PhD
Division of Science – Chemistry, Minot State University

12. DEBRIS-DEPENDENT RHEOLOGICAL HETEROGENEITY WITHIN STRATIFIED BASAL ICE 12
Nathan R. Hopkins[1)], Edward B. Evenson[2)], Dario Bilardello[3)], Claudio Berti[2)], Kenneth P. Kodama[2)]
[1)]Division of Sciences (Geoscience), Minot State University
[2)]Earth and Environmental Sciences, Lehigh University
[3)]Institute for Rock Magnetism, University of Minnesota

13. RAPID SYNTHESIS OF N-(2-FLUOROBENZYL)-N-METHYLFORMAMIDE 13
Hye Ji S. Lee, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

14. EFFECTS OF CREAM AND SUGAR ON CAFFEINE ABSORPTION 14
Ange Mensah, Annika Kraft, Brett Nespor, Shirley Cole-Harding, Naomi Winburn
Division of Science – Chemistry, Minot State University

15. ADOPTION OF MOBILE BANKING AMONG SMALL AND MEDIUM 15
ENTERPRISES IN KENYA
Daniel G. Ngugi[1)], Ph.D; Zhi Yang (Brian) Chan[2)],
[1)] College of Arts and Sciences, Minot State University
[2)] Accounting Dept., College of Business, Minot State University

16. RAPID SYNTHESIS OF N-METHYL-N-(4-FLUOROBENZYL)FORMAMIDE 16
Shin Young Park, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

17. INVESTIGATION OF THE SENSITIVITY OF *ACREMONIUM ALABAMENSE* 17
TO COMMON ANTIFUNGAL DRUGS
Shin Young Park, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

18. COMMUNICATION CHALLENGES OF INDIVIDUALS SUFFERING 18
FROM BINGE EATING DISORDER
Christina G. Paxman, Ph.D.
Communication Arts Department, Division of Humanities, Minot State University

19. DIAMONDS AND DIPLOMACY OR HOW TO SELL BRAZILIAN GEMS 19
ON THE EUROPEAN MARKET
Ernst Pijning
Division of Social Science, Minot State University

20. RAPID SYNTHESIS OF N-METHYL-N-(3-NITROBENZYL)FORMAMIDE 20
Megan D. Rodgers, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

21. VASCULAR PLANTS FLORA OF SOUTHWESTERN NORTH DAKOTA 21
Kyle Pay, Alexey Shipunov
Department of Biology, Minot State University

22. RAPID SYNTHESIS OF N-(3-FLUOROBENZYL)-N-METHYLFORMAMIDE.....22
Tess A. Skinner, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

23. JOHN KAERICHER ARCHIVE 23
Ryan Stander, Hannah Streccius, Eyeiessa Darville
Art Department, Humanities Division, Minot State University

24. RAPID SYNTHESIS OF N-METHYL-N-(2-NITROBENZYL)FORMAMIDE.....24
Stephanie E. Sundhagen, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

25. SCALABLE SYNTHESIS OF CANCER PREVENTING BENZYLMORPHOLINES.....25
Jordan L. Torgunrud, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

26. RAPID SYNTHESIS OF N-(4-CYANOBENZYL)- N-METHYLFORMAMIDE.....26
Benjamin S. Wilson, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
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Social Bonds and On-line Victimization: Utilizing Hirschi's Perspective in Explaining Youth On-line Victimization

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On-line Victimization of children has been of great concern for the contemporary society. The range of crimes that can victimize children in cyber world covers sexual exploitation, bullying, harassment, stalking, identity theft, and several others. The purpose of this particular study, which examined a data collected from high school and middle school students (n= 5647) in three north east states between 2011 and 2012 is to explore the impact of a child's social bonds on his/her likelihood of online victimization. Hirschy's Social Bond Theory identifies four major dimensions of social bond—attachment, involvement, commitment, and belief, but the data we used did not provide variables to measure "belief." In this study we included two types of victimization as our dependent variables: cyber victimization by a domestic partner (including victimization through social media, sexual victimization, and non-sexual victimization), and cyberbullying. First, a single level analysis was run and the results indicated that level of parental closeness, involving in activities and better communication with parents (attachment measures), school attendance, grades (commitment measures), prosocial activities (involvement measures), and time spend by using cell phone and computer were all negatively correlated with all types of cyber victimization. Second, we run multilevel binomial regression analyses for both kinds of cyber victimization. These analyses indicated that even when controlling for gender, time spent with computers and cell phones, measures of social bond remained as significant predictors of victimization in all types. The results indicate that the stronger the social bonds of a child, the less likely he/she will be to be victimized in the cyber world.

Time Interval Analysis of Caffeine Concentration in Human Saliva Utilizing GC/MS

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Saliva caffeine concentrations of human subjects who participated in a two day study were determined. ON one day subjects were given decaffeinated coffee and on the other day were given a decaffeinated coffee that had been dosed with 2 mg/kg of caffeine for every kg of their body weight. Subjects were asked to give a baseline saliva sample before either study began, and then at 15, 30, 45, 60, 90, and 120 minute intervals after the coffee had been consumed. The caffeine was then extracted from these samples using ethyl acetate in a liquid-liquid extraction. An internal standard of 30 mg/L of salicylic acid was added to each sample, which was then analyzed by gas chromatography/mass spectrometry. It was determined that for all 10 subjects the concentration of caffeine was found to have a maximum value at fifteen minutes with a range of 5.6-82.6 mg/L. Caffeine concentrations of individual subjects did not vary significantly during the placebo days of the study.

Support: The project was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Science of the National Institutes of Health under grant number P20GM103442

Determination of Ideal Conditions for the Formation of the Solid Solution Brownmillerite ($Ca_2(FeAl)O_5$) by X-Ray Diffraction

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Brownmillerite is a mineral that is rarely found in nature, but is a major component in many coal combustion by-products. This study focuses on determining the ideal conditions to effectively synthesize synthetic brownmillerite with various solid solution compositions. The synthesis was done using a fairly simple method of thoroughly mixing the reactants, heating the reaction mixture and then taking samples to follow the progression of the solid state reaction, via analysis using X-ray diffraction. The conditions varied included the ratio of reactant materials, temperature of heating, and total reactant mass. Additional experiments were done to determine if the introduction of mixing the samples throughout the heating process had any effect on the reaction rate. The results showed that at lower reaction temperatures, the reaction occurs at a much slower rate and that increasing the size of the reactant mixture also resulted in a slower rate of reaction. Results also showed that the ideal conditions to synthesis brownmillerite were a 1.5 g reaction mixture with a 50% iron and 50% aluminum ratio with intermittent mixing for 120 hours at 1150°C.

Rapid Synthesis of N-methyl-N-(2-trifluoromethylbenzyl)formamide

Tiffany A. Dostert-Azzarello, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

Background: Recently, we developed a rapid procedure for the Leuckart reaction and successfully applied it for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 3-(trifluoromethyl)benzaldehyde, a large amount of a by-product, N-methyl-N, N-di-(3-trifluoromethylbenzyl)amine was produced with an isolated yield of 33.1%. N-methyl-N-(3-trifluoromethylbenzyl)formamide was produced with an isolated yield of 47.6%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.44.

Hypothesis: Since the electron withdrawing action of trifluoromethyl group in the 2-position is stronger than that in the 3-position, the reaction with 2-trifluoromethylbenzaldehyde should produce more of the monobenzyl product and less of the dibenzyl product.

Methods: The reaction was conducted on 10 mmol scale at 188°C. Column chromatography was used for the isolation of the products. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was completed in 10 minutes. The isolated yields of N-methyl-N,N-di-(2-trifluoromethylbenzyl)amine (28.0%) and of N-methyl-N-(2-trifluoromethylbenzyl)formamide (59.5%) appeared to be 5% lower and 12% higher than the yields of the respective products in the previous reaction. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product increased from 1:1.44 to 1:2.13.

Conclusion: The results of the reaction support the initial hypothesis. The reaction provides a new method for the synthesis of N-methyl-N-(2-trifluoromethylbenzyl)formamide and N-methyl-N, N-di-(2-trifluoromethylbenzyl)amine. Both products of the reaction are new compounds.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences.

The Role Of Parental Involvement In Minority Students' Access To College Preparatory Programs – An Investigation In The Trio Upward Bound Program

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The purpose of this study was to better understand the impact of parental involvement as minority students access information while preparing for college. Two qualitative questions formed the foundation of this study: 1. How does parental involvement contribute to minority students' access to TRIO? 2. What roles do minority parents play in their children's education while they are enrolled in TRIO? Participants of this study were minority parents whose children were enrolled in TRIO. In total, 9 minority parents participated in this study – 67% Hispanic, 22% Pacific-Islanders, and 11% Native-American. To collect data a semi-structured interview was used; interviews were face-to-face and lasting approximately one hour. Three themes emerged from participants' interview: 1) passive parental involvement; 2) the impact of TRIO, and 3) active parental involvement. Examples and a further explanation of each theme are described throughout the poster.

Contrasting the Corporate Social Responsibility Perceptions of Generation X'ers

Megan Fixen
Business Administration, Minot State University

The purpose of this study was to examine differences between CSR perceptions of Generation X'ers from a sample of Generation X'ers in North Dakota. In this study, the researcher investigated generational perceptions of CSR by using Carroll's dimensions including economic, legal, ethical, and philanthropic responsibility to determine the importance of these dimensions as perceived by members of Generation X. The research questions helped the researcher examine if and to what extent statistically significant differences exist between Generation X'ers, dichotomized by those born in the 1960s and 1970s. The researcher used a quantitative, non-experimental, causal-comparative design for this research. The researcher used univariate ANOVA procedures to examine the differences in perception for economic and philanthropic CSR responsibilities between Generation X'ers. The researcher used Mann-Whitney U procedures to examine the difference in perception for legal and ethical CSR responsibilities between Generation X'ers. Although results provided support that statistically significant differences did not exist between Generation X'ers born in the 1960s and those born in the 1970s, this study provided evidence of which CSR perceptions Generation X'ers value most. Overall, members of Generation X place the highest value on legal (M = 32.4), followed by ethical (M = 27.0), economic (M =20.0), and philanthropic responsibilities (M = 16.6) respectively. These results may inform leadership decisions regarding which dimensions to utilize in building CSR initiatives and serve as a foundation for further scientific research.

Rapid synthesis of N-(10-chloro-9-anthrylmethyl)-N-methylformamide

Jonathan R. Gooding, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

Background: Recently, we developed a rapid procedure for the Leuckart reaction and successfully applied it for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 4-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(4-chlorobenzyl)-N-methylamine was produced with an isolated yield of 31.3%. N-(4-chlorobenzyl)-N-methylformamide was produced with an isolated yield of 52.0%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.66.

Hypothesis: The reaction conducted on electron-rich aromatic aldehydes may produce higher yields of N,N-diaryl-N-methylamines and lower yields of N-aryl-N-methylformamides. In this work the hypothesis was tested by conducting the reaction on 10-chloro-9-anthracene-carboxaldehyde.

Methods: The reaction was conducted on 10 mmol scale at 192-193°C. Column chromatography was used for the isolation of the products of the reaction. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was fully completed in 10 minutes. N-(10-chloro-9-anthrylmethyl)-N-methylformamide was produced as the main product with a higher isolated yield of 60.1%. N,N-di-(10-chloro-9-anthrylmethyl)-N-methylamine was also produced with a higher isolated yield of 38.9%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.55.

Conclusions: The results of the reaction tend to support the initial hypothesis. The reaction provides a new method for the synthesis of N-(10-chloro-9-anthrylmethyl)-N-methylformamide and N,N-di-(10-chloro-9-anthrylmethyl)-N-methylamine. Both products of the reaction are new compounds.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences of the National Institutes of Health.

Rapid Synthesis of N-methyl-N-(4-phenylbenzyl)formamide

Michal Gudejko, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

Background: Recently, we developed a rapid procedure for the Leuckart reaction and successfully applied it for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 4-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(4-chlorobenzyl)-N-methylamine was produced with an isolated yield of 31.3%. N-(4-chlorobenzyl)-N-methylformamide was produced with an isolated yield of 52.0%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.66.

Hypothesis: The reaction conducted on benzaldehydes with electron-donating substituents may produce higher yields of the respective N,N-dibenzyl-N-methylamines and lower yields of the respective N-benzyl-N-methylformamides. In this work the hypothesis was tested by conducting the reaction on 4-phenylbenzaldehyde.

Methods: The reaction was conducted on 10 mmol scale at 190-194°C. Column chromatography was used for the isolation of the products of the reaction. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Result: The reaction was completed in 10 minutes. The isolated yields of N-methyl-N,N-di-(4-phenylbenzyl)amine (41.2%) and N-methyl-N-(4-phenylbenzyl)formamide (44.5%) appeared to be approximately 10% higher and 8% lower than the yields of the respective products in the previous reaction. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.08.

Conclusion: The results of the reaction support the initial hypothesis. The reaction provides a new method for the synthesis of N-methyl-N-(4-phenylbenzyl)formamide and N-methyl-N,N-di-(4-phenylbenzyl)amine. Both products of the reaction are new compounds.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences.

What Matters Most? An Examination of Variables Related to Student Outcomes

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The CAA of the American Speech Language Hearing Association requires graduate classes be taught by terminally-degreed faculty in speech language pathology or a related field. PhD faculty are highly educated, expert researchers; however, because of specialization, may not have the most current content or pedagogical knowledge. Are PhD level faculty the most crucial factor in increasing student outcomes or is it something else? It is not clear what variables affect student performance. This study examined relationships between SLP graduate student outcomes and various program variables. The research questions were: Is there a relationship between SLP program variables and student outcome measures? What is the strength of these relationships?

Praxis scores: The following relationships were significant ($p<0.05$) in rank order: GRE Score ($p=0.010$), Cohort Size ($p=0.018$), University Size/Rank ($p=0.027$), Number of Graduate Faculty ($p=0.045$), and GPA--overall ($p=0.049$).

On-Time Graduation Rate: The following relationships were significant ($p<0.05$) in rank order: University Size/Rank ($p=0.017$) Program Length ($p=0.020$), GRE Scores ($p=0.033$), Cohort Size ($p=0.34$), Class Size ($p=0.42$), Faculty Rank ($p=0.049$).

Employment: The following relationships were significant ($p<0.05$) in rank order: GPA — Last 60 ($p=0.023$), University Size/Rank ($p=0.028$), GPA — Overall ($p=0.039$), and Faculty Rank ($p=0.41$).

Results show that GPA in the last 60, GRE, university size/rank, class and cohort size, faculty rank appear to be most closely related to higher student outcomes in graduate speech language pathology education.

Rapid synthesis of N-(9-anthrylmethyl)-N-methylformamide

Kaytlyn H. Heick, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

Background: Recently, we developed a rapid procedure for the Leuckart reaction and successfully applied it for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 4-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(4-chlorobenzyl)-N-methylamine was produced with an isolated yield of 31.3%. N-(4-chlorobenzyl)-N-methylformamide was produced with an isolated yield of 52.0%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.66.

Hypothesis: The reaction conducted on electron-rich aromatic aldehydes may produce higher yields of N,N-diaryl-N-methylamines and lower yields of N-aryl-N-methylformamides. In this work the hypothesis was tested by conducting the reaction on 9-anthracenecarboxaldehyde.

Methods: The reaction was conducted on 10 mmol scale at 186°C. Column chromatography was used for the isolation of the products. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was fully completed in 10 minutes. N-(9-anthrylmethyl)-N-methylformamide was still produced as the main product but with a lower isolated yield of 43.3%. N,N-di-(9-anthrylmethyl)-N-methylamine was also produced with a slightly lower isolated yield of 30.1%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.44.

Conclusions: The results of the reaction tend to support the initial hypothesis. The reaction provides a new method for the synthesis of N-(9-anthrylmethyl)-N-methylformamide and N,N-di-(9-anthrylmethyl)-N-methylamine. Both products of the reaction are new compounds.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences

Rapid Synthesis of N-methyl-N-(4-nitrobenzyl)formamide

Edjay Ralph A. Hernandez, Lioudmila I. Bobyleva, MS, and Mikhail Bobylev, PhD
Division of Science – Chemistry, Minot State University

Background: Recently, we developed a rapid procedure for the Leuckart reaction and successfully applied it for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 4-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(4-chlorobenzyl)-N-methylamine was produced with an isolated yield of 31.3%. N-(4-chlorobenzyl)-N-methylformamide was produced with an isolated yield of 52.0%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.66.

Hypothesis: Based on the higher electronegativity of the nitro group, the reaction with 4-nitrobenzaldehyde may produce a lower yield of the respective dibenzyl product and a higher yield of the respective monobenzyl product compared to the reaction with 4-chlorobenzaldehyde.

Methods: The reaction was conducted on 10 mmol scale at 187°C. Column chromatography was used for the isolation of the products. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was completed in 10 minutes. The isolated yields of N-methyl-N,N-di-(4-nitrobenzyl)amine (27.7%) and N-methyl-N-(4-nitrobenzyl)formamide (60.2%) appeared to be approximately 4% lower and 8% higher, respectively, than the yields of the respective products in the previous reaction. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:2.17.

Conclusions: The results of the reaction support the initial hypothesis. The reaction provides a new method for the synthesis of N-methyl-N,N-di-(4-nitrobenzyl)amine and N,N-di-(4-nitrobenzyl)-N-methylamine. Both products of the reaction are new compounds.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences.

Debris-dependent rheological heterogeneity within stratified basal ice

Nathan R. Hopkins[1)], Edward B. Evenson[2)], Dario Bilardello[3)], Claudio Berti[2)], Kenneth P. Kodama[2)]
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[3)]Institute for Rock Magnetism, University of Minnesota

The basal zone exerts significant control on the dynamics of glaciers and ice sheets, but basal ice is rheologically distinct from englacial ice owing to high proportions of fine-grained debris. Basal ice occurs as a thin (1-15m) zone at the base of glaciers and frequently contains a well-developed stratification of semi-continuous, alternating layers of debris-poor and debris-rich ice. Stratified basal ice (SBI) is genetically related to subglacial frazil ice forming as silt-laden water underplates the overlying glacial ice. However, the mechanism by which randomly distributed and randomly oriented debris within frazil segregates and organizes has yet to be adequately documented. Here, the distribution of shear within SBI is assessed through the anisotropy of magnetic susceptibility (AMS) of samples collected from the Matanuska Glacier, AK. Generally, AMS reveals consistent, moderately strong fabrics ($0.53 < S1 < 0.86$) that reflect simple shear in the direction of ice flow; however, fabric is dependent upon debris content and morphology. Debris-rich (50±10 wt. %) ice wherein silt is present in semi-continuous mm-scale layers possesses tri-axial fabrics reflecting shear along subhorizontal planes, whereas debris-poor (22±15 wt. %) ice containing mm-scale star-shaped silt aggregates possesses randomly distributed ellipsoids indicating no shear. Thus, deformation is concentrated in debris-rich layers, likely the result of decreased crystal size and greater availability of water. These results demonstrate that variation in debris-content influences the rheology of SBI, and suggest that the apparent stratification observed at glacier margins is a foliation that develops from preferential shear within debris-rich frazil following freeze-on.

Support: Minot State University (Division of Science & VPAA); Dept. of Earth & Environmental Sciences, Lehigh University; Tom Pasquini; ExxonMobil

Rapid synthesis of N-(2-fluorobenzyl)-N-methylformamide

Hye Ji S. Lee, Lioudmila I. Bobyleva, MS, and Mikhail M. Bobylev, PhD
Division of Science – Chemistry, Minot State University

Background: Recently, we developed a rapid procedure for the Leuckart reaction and successfully applied it for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 2-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(2-chlorobenzyl)-N-methylamine was produced with an isolated yield of 42.5%. N-(2-chlorobenzyl)-N-methylformamide was produced with an isolated yield of 37.3%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1.14:1.

Hypothesis: Based on the higher electronegativity of the fluoro group, the reaction with 2-fluorobenzaldehyde should produce a lower yield of the respective N,N-dibenzyl-N-methylamine and a higher yield of the respective N-benzyl-N-methylformamide compared to the reaction with 2-chlorobenzaldehyde.

Methods: The reaction was conducted on 10 mmol scale at 186-187°C. Column chromatography was used for the isolation of the products. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was completed in 10 minutes. The isolated yields of N,N-di-(2-fluorobenzyl)-N-methylamine (43.4%) appeared similar to the yield of N,N-di-(2-chlorobenzyl)-N-methylamine in the previous reaction. However, the isolated yield of N-(2-fluorobenzyl)-N-methylformamide (49.7%) was approximately 12% higher than the yield of N-(2-chlorobenzyl)-N-methylformamide. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product shifted from 1.14:1 to 1:1.14.

Conclusions: The results of the reaction support the initial hypothesis. The reaction provides a new method for the synthesis of N-(2-fluorobenzyl)-N-methylformamide and N,N-di-(2-fluorobenzyl)-N-methyamine. Both products of the reaction are new compounds.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences.

Effects of Cream and Sugar on Caffeine Absorption

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The purpose of this research was to determine the amount of caffeine present in human saliva after coffee ingestion. The study was divided in four separate sessions in which subjects were given caffeinated coffee only, caffeinated coffee with sugar, caffeinated coffee with cream, and caffeinated coffee with sugar and cream. The volume of caffeine added for each subject was determined from their body weight (2 mg/kg). The saliva was collected at 15 min interval during the first hour and 30 min interval during the second hour. Caffeine was extracted from the saliva samples using ethyl acetate and sodium dodecyl sulfate. The liquid from the extraction was analyzed with the GC/MS using salicylic acid (15 mg/L) as an internal standard. For coffee only, all subjects showed a peak at 15 min with a range of 2.3 to 16.9 mg/L which then drop quickly. With sugar in the coffee, all subjects showed a maximum caffeine concentration between 15 and 30 min (1.4 to 3.3 mg/L), with then drop much slower with an additional increase at 60 min (0.5 to 1.1 mg/L). When cream was added, the subjects showed an increase at 15 min (1.3 to 4.3 mg/L), with also a slower drop and another one by 60 min (0.4 to 1.2 mg/L) then drop. When sugar and cream were both added, the subjects showed an increase at 15 min (2.4 to 5.4 mg/L) with another increase at 60 min (1.1 to 2.5 mg/L).

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Adoption of Mobile Banking among Small and Medium Enterprises in Kenya

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A sample of 500 businesses were interviewed across the country with 231 valid observations. We used structural equation modelling for analysis. The study supports the hypotheses that facilitating conditions, social influence, price value, anxiety, performance expectancy, effort expectancy are antecedents behavioral intention to use mobile banking.

The potential for mobile banking to further change the way banking is done and to contribute to economic growth is immense. For example, at least a quarter of Kenya's Gross National Product (GNP) flows through mobile banking. This kind of impact has generated much enthusiasm in academia, the economic development community, and the technology fields. In order to examine the determinants of mobile banking among small and medium sized enterprises (SMEs) in Kenya, a stratified convenience sample of 1500 businesses were surveyed in seven regions of the country, between July and September, 2017. In the preliminary analysis of these data, about a half of these had been keyed in, and 231 clean observations established. The Unified Theory of Acceptance and Use of Technology in the context of consumers (UTAUT2) model, with eight constructs was proposed for this study. The model was enriched by a 2016 North Dakota Internet Banking study. The constructs included facilitating conditions, social influence, price value, anxiety, performance expectancy, effort expectancy, and behavioral intention. Structural Equation Modeling (SEM) was used to test the relationship between the various constructs. The results indicate that all except Price Value, directly affect mobile banking. Price value works through Performance expectancy to influence behavioral intention and by implication, use behavior. These findings should help the mobile banking community reach out to a wider client base, and strategize to better meet their customers' needs. The outcome would be increased shareholder profits, and greater contribution of the service to national incomes.

Support: Research for this project was funded in part by the Minot State University Small Grants for Faculty Research

Rapid synthesis of N-methyl-N-(4-fluorobenzyl)formamide

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Background: Recently, we developed a rapid procedure for the Leuckart reaction and successfully applied it for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 4-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(4-chlorobenzyl)-N-methylamine was produced with an isolated yield of 31.3%. N-(4-chlorobenzyl)-N-methylformamide was produced with an isolated yield of 52.0%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.66.

Hypothesis: Based on the higher electronegativity of the fluoro group, the reaction with 4-fluorobenzaldehyde may produce a lower yield of the respective N,N-dibenzyl-N-methylamine and a higher yield of the respective N-benzyl-N-methylformamide.

Methods: The reaction was conducted on 10 mmol scale at 183-184°C. Column chromatography was used for the isolation of the products. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Result: The reaction was completed in 10 minutes. The isolated yield of N,N-di-(4-fluorobenzyl)-N-methylamine (21.4%) appeared 10% lower than the yield of N,N-di-(4-chlorobenzyl)-N-methylamine in the previous reaction. The isolated yield of N-(4-fluorobenzyl)-N-methylformamide (69.4%) appeared 12% higher than the yield of N-(4-chlorobenzyl)-N-methylformamide in the previous reaction. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:3.25.

Conclusion: The results of the reaction support the initial hypothesis. The reaction provides a new method for the synthesis of N-(4-fluorobenzyl)-N-methylformamide and N,N-di-(4-fluorobenzyl)-N-methylamine. Both products of the reaction are new compounds.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences.

Investigation of the sensitivity of *Acremonium alabamense* to common antifungal drugs.

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Background: The devastation of the Souris River Flood of 2011 was not limited to the physical destruction of homes and infrastructure; dangerous molds grew in structures that have been inundated with floodwater. However, nothing was known about the types of the molds that could grow in these very unusual circumstances: the structures remained fully immersed in water for almost a month not in spring, but at the peak of the summer heat. For this reason, in the early fall of 2011, our team collected samples of the molds from the flooded homes in Minot. One of the isolated species, *Acremonium alabamense,* appeared especially interesting. It is a slow growing, thermophilic organism that thrives in the warm waters of Yellowstone. As such, it can grow in a human body where it can produce mycetomas, onychomycosis, keratitis, endophthalmitis, osteomyelitis, peritonitis, meningitis and endocarditis. The goal of the project is to investigate the sensitivity of *Acremonium alabamense* to most common types of the currently available antifungal drugs.

Methods: The tested antifungal drugs included a topical azole antifungal, chlotrimazole, two systemic azole antifungals (ketoconazole and fluconazole), two topical allylamine antifungals (butenafine and tolnaftate), and an agricultural azole fungicide tebuconazole that is also used in lumber protection. The antifungal drugs were tested as pure active ingredients incorporated into the agar medium at the initial concentration of 10^{-3} mole per liter. The diameters of the growing colonies were measured on the 10th, 15th, and 20th day.

Results: Both of the allylamine antifungals appeared to be completely inactive against *Acremonium alabamense.* The three azole antifungals were holding the growth of the fungus only during the first 10 days, after that the growth resumed. The only compound completely preventing the growth of the fungus appeared to be the industrial and agricultural fungicide tebuconazole.

Conclusion: The results of the research provide the first picture of the sensitivity of *Acremonium alabamense* to most common types of antifungal medications. The results will help medical professionals to determine better treatment options in case of *Acremonium alabamense* infections.

Support: The project was supported by the Minot State University Small Grant for Faculty Research and by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences.

Communication Challenges of Individuals Suffering from Binge Eating Disorder

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Binge eating disorder (BED) affects nearly 3% of the U.S. population (NIMH, 2018) and poses a significant threat to the health of individuals afflicted with the condition. BED is associated with anxiety, mood disorders (e.g., depression), high body mass index (BMI) levels, high blood pressure, and diabetes (Kessler et al., 2013). Despite these risks, little is known about the communication surrounding binge eating and what implications it has for binge eaters. This study was designed to gather formative data about the communication phenomena that are most salient to binge eaters.

For the purpose of conducting an open-ended investigation, I analyzed 68 stories told by binge eaters. Stories were selected from the Experience Project website, which is a collection of over 18 million stories pertaining to a variety of self-identified topics. I employed thematic analysis (Braun & Clarke, 2006) to inductively analyze data. Three themes emerged: *Privacy Management, Social Support,* and *Social Control*. Through their stories, binge eaters indicate that they often keep their condition a secret and, upon revealing their condition, often receive what they consider to be inadequate or unproductive social support and social control. These results have a variety of implications and offer several potential directions for subsequent research. In particular, these results can inform future studies of binge eaters' help-seeking behaviors, which can help scholars and practitioners understand how binge eaters seek resources. Additionally, this data can be used to design health campaigns or outreach programs that help binge eaters acquire treatment and social support.

Diamonds and Diplomacy or how to sell Brazilian gems on the European market

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During the eighteenth century, most of the world's supply of diamonds came from Brazil. Since Brazil was a Portuguese colony, all diamonds had to be sent through Lisbon. Contractors monopolized the marketing of diamonds and diplomats controlled and supervised the sale of gems. In this network, Amsterdam in the Netherlands was key to diamond polishing and marketing; the main contractor was Daniel Gildemeester, the consul-general for the Netherlands in Portugal. Based on my research in Dutch and Portuguese archives, the poster for this project explores the connections among diamonds, diplomacy and commerce.

From my research it became apparent that Daniel Gildemeester's personal contacts made as consul general were crucial in him obtaining and maintaining the diamond polishing and marketing contract. Likewise, Martinho de Mello e Castro, the Portuguese ambassador to Amsterdam and London, was also fundamental to the Portuguese Crown finding the right contractor — Daniel Gildemeester — confirming the further connection between the diplomatic and mercantile networks necessary for the sale of these rare gems.

Support: This research was partly sponsored from a small research grant, Minot State University, and by the Gulbenkian Foundation (Portugal)

Rapid synthesis of N-methyl-N-(3-nitrobenzyl)formamide

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Background: Recently, we developed a rapid procedure for the Leuckart reaction and successfully applied it for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 3-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(3-chlorobenzyl)-N-methylamine was produced with an isolated yield of 32.6%. N-(3-chlorobenzyl)-N-methylformamide was produced with an isolated yield of 41.8%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.28.

Hypothesis: Based on the higher electronegativity of the nitro group, the reaction with 3-nitrobenzaldehyde may produce a lower yield of the respective dibenzyl product and a higher yield of the respective monobenzyl product.

Methods: The reaction was conducted on 10 mmol scale at 188°C. Column chromatography was used for the isolation of the products. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was completed in 10 minutes. The isolated yield of N-methyl-N,N-di-(3-nitrobenzyl)amine (30.5%) appeared to be slightly lower than the yield of N,N-di-(3-chlorobenzyl)-N-methylamine in the previous reaction. The isolated yield of N-methyl-N-(3-nitrobenzyl)formamide (42.6%) appeared to be slightly higher than the yield of N-(3-chlorobenzyl)-N-methylformamide. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.40.

Conclusions: The results of the reaction support the initial hypothesis. The reaction provides a new method for the synthesis of N-methyl-N-(3-nitrobenzyl)formamide and N-methyl-N,N-di-(3-nitrobenzyl)amine. Both products of the reaction are new compounds.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences.

Vascular Plants flora of southwestern North Dakota

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Vascular Plants flora of southwestern North Dakota North Dakota is among a few North American regions which have not been studied in full for plant diversity. Before 2011, only 55% of state territory was covered with botanical research. From 2011, the team under my supervision is surveying these botanical "white spots" using 30×30 miles virtual grid. Every plant was photographed, geo-referenced (with precise GPS coordinates) and collected. To date, almost 5,500 plant samples were taken across the state. These samples, along with other sources, became a basement of our North Dakota Plant Checklist. In 2017, the checklist was completely re-organized and updated under supervision of BONAP (Biota of North America Program). It contains now about 1,600 species of vascular plants.

Western North Dakota and especially locations close to the three corners of Montana, South Dakota and North Dakota borders are one of the botanical hot spots where botanical survey should significantly increase the amount of information about North Dakota plants. In 2017, we researched multiple spots in Slope, Billings and Bowman county, as well as several other locations, and found several species of plants which are completely new to North Dakota! One of the most remarkable finding is a grass (collected in Bullion Butte, Billings county) with *Agropyron desertorum* affinities, but morphologically divergent and therefore possibly the plant form new for the science. There are two other species *(Logfia arvensis and Cirsium palustre)* which represent the ongoing process of invasion, and two *(Chrysothamnus viscidiflorus and Lemna minuta)* which were never registered in North Dakota before. In addition, we checked the condition of only one known North Dakota population of *Pinus flexilis,* limber pine (Slope county), and found the westernmost location of *Selaginella rupestris* (McHenry county). All in all, our 2017 summer research was exceedingly productive and demonstrated the high potential of the future botanical investigations in the state.

Rapid Synthesis of N-(3-fluorobenzyl)-N-methylformamide

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Background: Recently, we developed a rapid procedure for the Leuckart reaction and successfully applied it for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 3-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(3-chlorobenzyl)-N-methylamine was produced with an isolated yield of 32.6%. N-(3-chlorobenzyl)-N-methylformamide was produced with an isolated yield of 41.8%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.28.

Hypothesis: Based on the higher electronegativity of the fluoro group, the reaction with 3-fluorobenzaldehyde may produce a lower yield of the respective N,N-dibenzyl-N-methylamine and a higher yield of the respective N-benzyl-N-methylformamide.

Methods: The reaction was conducted on 10 mmol scale at 188°C. Column chromatography was used for the isolation of the products of the reaction. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was completed in 10 minutes. The isolated yield of N,N-di-(3-fluorobenzyl)-N-methylamine (32.2%) appeared to be very close to the yield of N,N-di-(3-chlorobenzyl)-N-methylamine in the previous reaction. However, the isolated yield of N-(3-fluorobenzyl)-N-methylformamide (62.5%) was approximately 20% higher than the yield of N-(3-chlorobenzyl)-N-methylformamide. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.94.

Conclusions: The results of the reaction support the initial hypothesis. The reaction provides a new method for the synthesis of N-(3-fluorobenzyl)-N-methylformamide and N,N-di-(3-fluorobenzyl)-N-methylamine. Both products of the reaction are new compounds.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences.

John Kaericher Archive

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Purpose: The John Kaericher Printing and Archive project was a collaboration between Flat Tail Press, and John and Bonnie Kaericher. Originally, the project set out to finish several of John's print editions that his cancer diagnosis had not allowed him to do in retirement. However, John's illness grew steadily worse as we ramped up our printing in the spring of 2017. In June of 2017 after a long battle with cancer, John died which shifted our plans from printing to archiving his work.

In July of 2017, BFA student Hannah Streccius and professor Stander spent a week in Orange City, Iowa organizing, archiving, photographing and distributing John's work to 3 colleges and universities (Northwestern College, Dordt Collge and Minot State University). What began in research ended in service as we emptied and cleaned his studio dispersing the massive amounts of supplies among the three schools.

Results: Upon return to North Dakota, over 50 prints and drawings were added to Minot State University's permanent collection donated by Bonnie in appreciation. Additionally, thousands of dollars in supplies were brought back to MSU in the form of zinc plates, inks, etching felts, print tools, etc. The final step was the curation a self-published book highlighting many of John's better works. I worked with MSU BA Graphic Design Student Eyeiessa Darville to design a fitting tribute and legacy to his work that includes images of his prints and drawings, as well as pages of ephemera including photographs of John, news articles, letters, and artist statements. The volume is now available at Blurb.com.

Support: Minot State University Research Grant; Flat Tail Press; Northwestern College (IA)

Rapid Synthesis of N-methyl-N-(2-nitrobenzyl)formamide.

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Background: Recently, we developed a rapid procedure for the Leukart reaction and successfully applied it for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 2-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(2-chlorobenzyl)-N-methylamine was produced with an isolated yield of 42.5%. N-(2-chlorobenzyl)-N-methylformamide was produced with an isolated yield of 37.3%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1.14:1.

Hypothesis: Based on the higher electronegativity of the nitro group, the reaction with 2-nitrobenzaldehyde may produce a lower yield of the respective dibenzyl product and a higher yield of the respective monobenzyl product compared to the reaction with 2-chlorobenzaldehyde.

Methods: The reaction was conducted on 10 mmol scale at 183-184°C. Column chromatography was used for the isolation of the products. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was completed in 10 minutes. The isolated yields of N-methyl-N,N-di-(2-nitrobenzyl)amine (19.6%) and N-methyl-N-(2-nitrobenzyl) formamide (60.6%) appeared to be 23% lower and 23% higher than the yields of the respective products in the previous reaction. The ratio of yield of the dibenzyl product to the yield of the monobenzyl product was 1:3.09.

Conclusions: The results of the reaction support the initial hypothesis. The reaction provides a new method for the synthesis of N-methyl-N-(2-nitrobenzyl) formamide and N-methyl-N,N-di-(2-nitrobenzyl)amine. Both products of the reaction are new compounds.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences.

Scalable synthesis of cancer preventing benzylmorpholines

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Background: Substituted benzylmorpholines, and primarily halogen-substituted benzylmorpholines, possess remarkable cancer-preventative activity. Considering their potential use as medicines, we decided to investigate, if the Leuckart reaction can provide a better alternative to the existing methods for their synthesis. Last year we reported a successful synthesis of 4-chlorobenzylmorpholine via the Leuckart reaction with the isolated yield of 80%. Extraction and column chromatography were used for the isolation of the product.

Hypothesis: Extraction and column chromatography steps are mostly responsible for the losses of the isolated product. Therefore, their elimination may increase the isolated yield of the product. It may also simplify the procedure and make it more suitable for a future scale-up.

Methods: The reactions were conducted on 2.5, 10, and 50 mmol scale. The product in the 2.5 mmol reaction was isolate by column chromatography alone. In the 10 and 50 mmol reactions, 90% of the product were isolated by a newly developed selective precipitation procedure.

Results: The total yield of N-(4-chlorobenzyl)morpholine in the 2.5, 10 and 50 mmol reactions were 93-95%, 94%, and 100%, respectively.

Conclusions: A new simple and scalable method for the synthesis of N-(4-chlorobenzyl)morpholine was developed.

Support: Research reported in this publication was supported by ND EPSCoR (EPSCoR NSF RII Track-1 Award #1355466) and by ND INBRE (NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences).

Rapid synthesis of N-(4-cyanobenzyl)- N-methylformamide

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Background: Recently, we developed a rapid procedure for the Leuckart reaction and successfully applied it for the synthesis of substituted N-benzyl-N-methylformamides. Interestingly, in the reaction conducted on 4-chlorobenzaldehyde, a large amount of a by-product, N,N-di-(4-chlorobenzyl)-N-methylamine was produced with an isolated yield of 31.3%. N-(4-chlorobenzyl)-N-methylformamide was produced with an isolated yield of 52.0%. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.66. Hypothesis: Based on the higher electronegativity of the cyano group, the reaction with 4-cyanobenzaldehyde may produce a lower yield of the respective N,N-dibenzyl-N-methylamine and a higher yield of the respective N-benzyl-N-methylformamide.

Methods: The reaction was conducted on 10 mmol scale at 189-190 °C. Column chromatography was used for the isolation of the products. NMR-spectroscopy and elemental analysis were used to determine the structures of the products.

Results: The reaction was completed in 10 minutes. The isolated yield of N,N-di-(4-cyanobenzyl)-N-methylamine (37.5%) appeared 6.2% higher than the yield of N,N-di-(4-chlorobenzyl)-N-methylamine in the previous reaction. The isolated yield of N-(4-cyanobenzyl)-N-methylformamide (46.5%) appeared 5.5% lower than the yield of N-(4-chlorobenzyl)-N-methylformamide in the previous reaction. The ratio of the yield of the dibenzyl product to the yield of the monobenzyl product was 1:1.24.

Conclusion: The results of the reaction do not support the initial hypothesis. The reaction provides a new method for the synthesis of N-(4-cyanobenzyl)-N-methylformamide and N,N-di-(4-cyanobenzyl)-N-methylamine.

Support: The project was supported by NIH grant 8 P20 GM103442-12 from the National Institute of General Medical Sciences.