

# CURRICULUM VITAE

HAMZEH M. ABDEL-HALIM

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## PERSONAL:

Full Name : Hamzeh Moh'd Abdel-Halim

Nationality : Jordanian

Marital Status : Married

## EDUCATION BACKGROUND:

**Ph.D. August 1984** Indiana University, Bloomington, Indiana, USA

*Major :* Physical Chemistry: Laser Spectroscopy

*Dissertation:* "Vibrational Energy Transfer in Liquids"

**M.Sc. July 1979** The University of Jordan, Amman, Jordan

*Major:* Theoretical Physical Chemistry

*Thesis:* "Rotational-Vibrational Energy Distribution in Atom-Diatom  
Collisions"

**B.Sc. June 1977** The University of Jordan, Amman, Jordan

*Major:* Chemistry

## EMPLOYMENT HISTORY:

Isra University (Jordan)	<i>Professor</i>	October 2016 - Present
The Hashemite University (Jordan)	<i>Professor</i>	May 2008 - Present
The Hashemite University (Jordan)	<i>Associate professor</i>	Feb 2000 - May 2008
Sultan Qaboos University (Oman)	<i>Associate professor</i>	Apr 1998 – Feb 2000
Sultan Qaboos University (Oman)	<i>Assistant Professor</i>	Aug 1990 – Apr 1998
The University of Jordan (Jordan)	<i>Assistant Professor</i>	Aug 1986 – Aug 1990
The Johns Hopkins University (USA)	<i>Post-doctoral fellow</i>	1984 – 1986.

## **I) TEACHING AND COURSE DEVELOPMENT**

### **1) TEACHING EXPERIENCE:**

During my presence at the above institutions, I acquired a good background in teaching **graduate** and **undergraduate** courses dealing with the following topics:

1. General Chemistry
2. Practical General Chemistry
3. Chemical Thermodynamics
4. Chemical Kinetics
5. Electrochemistry
6. Practical Physical Chemistry
7. Atomic and Molecular Spectroscopy
8. Statistical Mechanics
9. Quantum Chemistry
10. Lasers and their Applications
11. Computers in Chemistry
12. Undergraduate research
13. Supervising M.Sc. students

### **2) COURSE DEVELOPMENT:**

1. "*Laboratory Manual for Experimental General Chemistry I*", CHEM103, Hamzeh Abdel-Halim. The Hashemite University.
2. "*Laboratory Manual for Experimental General Chemistry II*", CHEM104, Hamzeh Abdel-Halim. The Hashemite University.
3. "*Laboratory Manual for Experimental General Chemistry for Engineering Students I*", CHEM108, Hamzeh Abdel-Halim, Nayif Masoud, Khalid Al-Ani and Adnan Abu-Surrah. The Hashemite University.
4. Co-author: "*Laboratory Manual for Physical Chemistry Laboratory*", CHEM345, for senior level chemistry majors.
5. Set up experiments for **General** and **Physical Chemistry Laboratories**. This included designing, fabricating, ordering, and building of equipment needed for experiments.
6. Introduced several **Computer-Interactive Experiments** for general chemistry and for various topics in physical chemistry taught in physical chemistry courses.

## II) RESEARCH EXPERIENCE:

During my presence as a post-doctoral fellow at the Johns Hopkins University, I worked on a multi-million dollars research project sponsored by the *United State Air Force (USAF)*. The research project was on laser technology involving Non-Linear Optics (NLO) and Second-Harmonic Generation (SHG). I was *the primary* researcher, and set up a research laboratory from scratch. I equipped the laboratory with lasers, electronic equipment, power supplies, etc. The laboratory is still active at the Johns Hopkins University. My contribution in the laboratory resulted in several papers.

During my presence at several various institutions; **Indiana University** (USA), **The Johns Hopkins University** (USA), **The University of Jordan** (Jordan), and **Sultan Qaboos University** (Oman), **the Hashemite University** (Jordan), and **Ulm University** (Germany), I was involved in various research activities in *experimental* and *theoretical physical chemistry*, involving the following topics:

- 1) Laser Technology
- 2) Energy Transfer in Liquids
- 3) Non-Linear Optics: Second-Harmonic Generation
- 4) Theoretical Modeling for Energy transfer in Quantum and Classical Collisions.
- 5) Chemical Kinetics
- 6) Theoretical Modeling for Thermodynamics of Solutions

While working on these research projects, I acquired extensive experience in the following areas:

1. Design and construction of the following lasers:  
Gas Lasers: CO and CO<sub>2</sub> lasers  
Chemical Lasers: HBr and HF Lasers  
Solid State Lasers: Nd:YAG and Ruby Lasers  
Dye Lasers Excimer Lasers
2. Medium and high vacuum and cryogenics technology
3. Design and construction of high vacuum and cryogenics apparatus
4. Optics, photomultipliers, phototubes, signal averager, detectors and gratings
5. Computers and computer programming (FORTRAN and BASIC)
6. Analog and Digital Electronics
7. Machining and instrument fabrication.

*Please see list of publications for details.*

## STUDENTS' RESEARCH PROJECTS:

### 1) Supervision of M.Sc. STUDENTS (The Hashemite University)

1. *"Kinetics Study of Competitive Adsorption of Food Colorants on Natural Jordanian Clay."* Mrs. Huda Al Masri graduated with M.Sc. degree [June 2015].
2. *"Synthesis of Some Transition Metal Complexes with Tetradentate Salicylidene Schiff Bases: Kinetics of the Complexes as Catalysts for Oxidation of Amino Acids using Stopped-Flow Spectrophotometry."* Ms. Heba Abu-Shehab graduated with M.Sc. degree [April 2015].
3. *"Kinetics of Oxidation of Atropine and its Derivatives by Various Oxidizing Agents."* Mr. Sanad Al-Ghraozat graduated with M.Sc. degree [November 2014].
4. *"A Molecular Dynamics Simulation Study of the Structural Features and Inclusion Capacity of Cucurbit(6)uril Derivatives in Aqueous Solutions."* Ms. Feryal Haj-Ibrahim graduated with M.Sc. degree [June 2010].
5. *"Kinetics of Amino Acids Oxidation by Ruthenium(III), Rhodium (III), and Iridium(III) Complexes of Ammonia, Ethylene diamine, Bipyridine and 1,10-Phenanthroline ligands."* Ms. Abala Afaneh graduated with M.Sc. degree [December 2009].
6. *"Synthesis, characterization, and kinetic studies of some iron(III), cobalt(III), and chromium(III) complexes with bidentate diimine and salen ligands."* Ms. Fida' Al-Qaisi graduated with M.Sc. degree [July 2007].
7. *"Reaction Cross Section in Atom – Diatomic Molecule Collisions."* Ms. Sawsan Ja'afreh graduated with M.Sc. degree [January 2006].
8. *"Kinetics of Oxidation L-Cysteine by Transition Metal Complexes."* Ms. Shatha Qaqesh graduated with M.Sc. degree [January 2004].

## 2) UNDERGRADUTE STUDENTS (Sultan Qaboos University)

1. "Ligand Effect on Oxidation Rates of Cysteine by Iron(III) Complexes", H.M. Abdel-Halim, S.B. Salama, and S.K. Al-Burtmani, *Pak. J. Sci. Ind. Res.*, **41**, 71 (1998).
2. "Energy transfer in classical trajectories of atom-diatom molecule collisions", Hamzeh M. Abdel-Halim and Badria Al-Shihi, *Indian J. Chem.*, **35A**, 366 (1996).
3. "Kinetics of Amino Acids Oxidation by Alkaline Transition Metal Complexes", Hamzeh M. Abdel-Halim and Yasmeen Al-Lawatia, *Asian J. Chem.*, **6**, 655 (1994).

## III) ADMINISTRATIVE EXPERIENCE:

During my presence at various institutions, I hold, or at one time hold, the following administrative responsibilities:

1. **Chair** of the Department of Chemistry (The Hashemite University; July 2000 September 2003).
2. **Acting Head** of the chemistry department & **Acting Dean** of the college of Science (Sultan Qaboos University)
3. Physical chemistry **Subject Leader**
4. **Chairman** of the **Departmental Curriculum Committee**
5. Chemistry representative to the **College of Science Curriculum Committee**
6. In charge of the department of chemistry **computers** (Hardware and Software)
7. Chemistry representative to the **College of Science Computer Committee**
8. Chemistry representative to the **University Computer Committee**
9. **Industrial Liaison Officer**
10. Chemistry representative to the **External Relation Committee**
11. **Academic advisor** to M. Sc. chemistry students
12. Member of the **Department of Chemistry Research Committee**
13. Member of **Graduate Students Admission and Research Committee**
14. Departmental **Safety Officer**
15. **Advisor** to the "Students Chemical Society"

#### IV) COMMUNITY SERVICES:

*"New Applications for Expandable Polystyrene"*. Research project supported by The Higher Council for Science and Technology incorporation with *Insostrong* Company for the Manufacturing of Insulated Materials.

#### V) CONFERENCES:

1. 12<sup>th</sup> Eurasia Conference on Chemical Sciences (EuAsC2S-12). Title: *"Reaction Rate Constant of Atom-Diatomic Molecule Collisions: Effect of Potential Energy Surfaces."* April 16-21, 2012. Corfu, Greece.
2. First United Arab Emirates Conference on Pure and Applied Chemistry (ECPAC11). Title: *"Kinetics of Oxidation of L-Cysteine with Cobalt(III), Iron(III), and Chromium(III) Complexes of Salicylaldiminato Ligands."* March 1-3, 2011. American University of Sharja, UAE.
3. Zing Coordination Chemistry Conference, Title: *"Kinetics of oxidation of L-cysteine by trans- and cis- Co(III) and Fe(III) complexes based on  $\alpha$ - and  $\gamma$ -diimine Schiff base ligands."* March 15-18, 2009. Anigua and Barbuda.
4. The 59th Annual Meeting of the International Society of Electrochemistry. Title: *"Comparative studies of the adsorption of cysteamine, mercaptopropionic acid and L-cysteine on Ag(111)."* September 7-12, 2008, Seville, Spain.
5. 8-th International Balkan Workshop on Applied Physics. Title: *"Reaction cross section in atom-diatomic molecule collisions."* July 5-7, 2007, Constanta, Romania.
6. Romanian Conference on Advanced Materials: ROCAM". Title: *"Second-Harmonic Generation in the Solid State."* September 11-14th, 2006, Bucharest-Magurele, Romania.
7. International Conference on Research Trends in Science and Technology. Title: *"Non-Linear Optical Properties of of Some Organic Compounds in Powder."* March 7-9, 2005. Beirut & Byblos, Lebanon.
8. Second International Conference on Chemistry and its Application. Title: *"Electric Field Induced Second Harmonic Generation: Second and Third Order Hyperpolarizabilities of 4-amino-4'-nitrodiphenyl sulfoxide."* December 6-9, 2003 Doha – Qatar.

## VI) EXTRA-CURRICULUM ACTIVITIES:

1. Chairman / Member of an accreditation committee appointed by the Higher Education Accreditation Commission (هيئة أعتاماد مؤسسات التعليم العالي) - Ministry of Higher Education, to evaluate chemistry programs in various Jordanian universities.
2. Supervising a research group working on an industrial research project supported by The Higher Council for Science and Technology, in cooperation with InsoStrong Company, under the title: "New Useful Applications for Expandable Polystyrene".
2. Member of the Editorial Board of the *Jordanian Journal of Chemistry* (2011-2015).
3. Member of the Jordanian national team for "Synchrotron Radian Project."
4. Member of the Jordanian Astronomical Society.
5. External examiner for Ph.D. and M. Sc. Theses in Jordan and abroad.
6. Referee for the "Pakistani Journal of Science and Industrial Research".
7. Training technicians and junior faculty members on computers, research instruments and equipment.
8. Co-authored the book, "*College of Science; Development and Progress.*" An information booklet on the College of Science at SQU produces by the College External Relation Committee.
9. Construct the Department of Chemistry Web Page on the Internet [<http://www.hu.edu.jo>].

### MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS:

1. Jordanian Chemical Society.
2. American Chemical Society.

### MEMBERSHIP IN PROFESSIONAL JOURNALS:

1. *Laser Focus World*, 1984 - present.
2. *Solid State Technology*, 1990 - present.

### RESEARCH VISIT:

Deutsche Forschungsgemeinschaft (DFG) research visit: June 15 – September 15, 2006. Germany, Universitat Ulm, Gruppe Laseranwendungen. Professor Dr. Harold Jones group. "*Cavity Ring-Down Spectroscopy*" and "*Non-Linear Spectroscopy of Second-Harmonic Generation on Surfaces*".

## PUBLICATIONS

### I) Published Papers:

1. "Iron and Cobalt salicylaldimine Complexes as Catalysts for Epoxide and Carbon Dioxide Coupling: Effects of Substituents on Catalytic Activity", Adnan S. Abu-Surrah, **Hamzeh M. Abdel-Halim**, Hebah A. N. Abu-Shehab and Israa Al-Ramahi *Transition Met. Chem.* **42**, 117 (2017).
2. "Application of multivariate calibration for studying competitive adsorption of two problematic colorants on acid-activated-kaolinitic clay", A. A. Issa, **H. M. Abdel-Halim**, Y. S. Al-Degs, H. A. Al-Masri. *Res Chem Intermed.* **43**, 523 (2017).
3. "Molecular Dynamics of Nor-Seco-Cucurbit[10]uril Complexes", Musa I. El-Barghouthi, **Hamzeh M. Abdel-Halim**, Feryal J. Haj-Ibrahim, Khaleel I. Assaf. *J Incl Phenom Macrocycl Chem* **82**, 323 (2015).
4. "Kinetics of Oxidation of Atropine by Alkaline  $KMnO_4$  in Aqueous Solutions", Abdullah I. Saleh, Sanad K. Al-Ghreizat, and Hamzeh M. Abdel-Halim. *Asian J. Chem.* **27**, 3877 (2015).
5. "Molecular Dynamics Simulation Study of the Structural Features and Inclusion Capacities of Cucurbit[6]uril Derivatives in Aqueous Solutions." Musa I. El-Barghouthi, **Hamzeh M. Abdel-Halim**, Feryal J. Haj-Ibrahim, Khaleel I. Assaf. *Supramolecular Chemistry*, **27**, 80 (2015).
6. "Kinetics of Oxidation of L-Cysteine by Cobalt (III), Iron(III), and Chromium(III) Complexes of Salicylaldiminato Ligands." **Hamzeh M. Abdel-Halim**, Adnan S. Abu-Surraha, and Hutaf M. Baker. *Jordan J. Chem.* **7**, 33 (2012).
7. "Kinetics of oxidation of L-Cysteine by trans- and cis- Co(III) and Fe(III) complexes based on  $\alpha$ - and  $\gamma$ -diimine Schiff base ligands." **Hamzeh M. Abdel-Halim**, Adnan S. Abu-Surrah, and Hutaf M. Baker. *Z. Anorg. Allg. Chem.* **636**, 872 (2010).
8. "Salicylaldiminato-based cobalt(III)-, iron(III)-, and chromium(III)/methyl aluminoxane catalyst systems for polymerization of t-butyl acrylate." Adnan S. Abu-Surrah, Khalid A. Ibrahim and **Hamzeh M. Abdel-Halim**. *Transition Met. Chem.* **34**, 803 (2009).



9. "Effects of vibrational and rotational energy on reaction cross section in classical trajectory study of atom-diatom molecule collisions." **Hamzeh M. Abdel-Halim** and Sawsan M. Jaafreh. *Zeitschrift für Naturforschung A*. **63a**, 721 (2008).
10. "Synthesis of Cobalt(III), Iron(III), and Chromium(III) Complexes with Salicylaldiminato Ligands: Evaluation of the Complexes as Catalysts for Oxidation of L-Cysteine", Adnan S. Abu-Surrah, **Hamzeh M. Abdel-Halim**, and Feda'a M. Al-Qaisi. *Zeitschrift für Naturforschung B*. **63b**, 848 (2008).
11. "Reaction rate constants from classical trajectories of atom-diatom molecule collisions." **Hamzeh M. Abdel-Halim** and Sawsan M. Jaafreh. *Zeitschrift für Naturforschung A*. **63a**, 159 (2008).
12. "Trans- and cis- Cobalt(III), Iron(III), and Chromium(III) Complexes Based on  $\alpha$ - and  $\gamma$ -Diimine Schiff Base Ligands: Synthesis and Evaluation of the Complexes as Catalysts for Oxidation of L-Cysteine." Adnan S. Abu-Surrah, **Hamzeh M. Abdel-Halim**, and Feda'a M. Al-Qaisi. *Z. Anorg. Allg. Chem.* **634**, 956 (2008).
13. "Removal of Nickel ions from Aqueous Solutions by Using Insolubilized Humic Acid. Effect of pH and Temperature." Hutaf Baker and **Hamzeh A. Halim**. *Asian J. Chem.* **19**, 233 (2007).
14. "Kinetics of Oxidation of L-Cysteine by trans- and cis-Cobalt(III) and Iron(III) Complexes." **Hamzeh M. Abdel-Halim**, Adnan S. Abu-Surrah, and Hutaf M. Baker. *Zeitschrift für Naturforschung*. **61b**, 1346 (2006).
15. "Kinetics of Oxidation of L-Cysteine by Transition Metal Complexes." **Hamzeh M. Abdel-Halim**, Adnan S. Abu-Surrah and Shatha E. Qaqish. *Asian J. Chem.* **18**, 947 (2006).
16. "A Model to Evaluate Solubility of Sparingly Soluble Salts in Electrolytes' Solutions." **Hamzeh M. Abdel-Halim**, Ayman A. Issa and Adnan S. Abu-Surrah. *Asian J. Chem.* **17**, 525 (2005).
17. "Impedance spectroscopy of binary solutions." Saadi Abdul Jawad, **Hamzeh M. Abdel-Halim**, Hayel Shehadeh & Awni B Hallak. *Indian J. Chem.* **43A**, 1181 (2004).

18. "Synthesis, spectroscopy and molecular structures of new salicylketiminato nickel(II) complexes." Mika Kettunen, Adnan S. Abu-Surrah, **Hamzeh M. Abdel-Halim**, Timo Repo, Markku Leskela, Maarit Laine, Ilpo Mutikainen, Markku Ahlgrten. *Polyhedron* **23**, 1649 (2004).
19. "Second-Order Nonlinear Optical Properties of Some Organic Compounds in Powder." **Hamzeh M. Abdel-Halim**. *Ind. J. Eng. Mat. Sci.* **11**, 207 (2004).
20. "Spectroscopic Constants of Diatomic Molecules: Theoretical Calculations Using a Morse Potential Based Model." **Hamzeh M. Abdel-Halim**. *Oriental J. Chem.* **20**, 31 (2004).
21. "Synthesis and Spectroscopy of New palladium(ii) and Zirconium(iv) Complexes Containing Binucleating Indenyl- and Bis(indenyl) Ethane-Phosphine Ligands." Adnan S. Abu-Surrah and **Hamzeh M. Abdel-Halim**. *Oriental J. Chem.* **20**, 197 (2004).
22. "Electric Field Induced Second Harmonic Generation: Second and Third Order Hyperpolarizabilities of 4-amino-4'-nitrodiphenyl sulfoxide." **Hamzeh M. Abdel-Halim**. *J. Chem. Phys.* **119**, 484 (2003).
23. "A Model to Calculate Vibrational-Vibrational Energy Transfer Between Diatomic Molecules." **Hamzeh M. Abdel-Halim**. *Oriental J. Chem.* **18**, 233 (2002).
24. "Kinetics of Oxidation of L-Ascorbic Acid by Cobalt(III) Complexes." **Hamzeh Abdel-Hali**. *Jour. Chem. Soc. Pak.* **23**, 69 (2001).
25. "Kinetics of Oxidation of Cysteine by Cobalt(III) Complexes." **Hamzeh M. Abdel-Halim**. *International Jour. Chem.* **11**, 131 (2001).
26. "Ligand Effect on Oxidation Rates of Cysteine by Iron(III) Complexes." **Hamzeh M. Abdel-Halim**, S.B. Salama, and S.K. Al-Burtmani. *Pak. J. Sci. Ind. Res.* **41**, 71 (1998).
27. "Temperature dependence of vibrational relaxation of N<sub>2</sub> by O<sub>2</sub> in liquid N<sub>2</sub> along the coexistence curve." **Hamzeh M. Abdel-Halim**. *J. Chem. Phys.* **104**, 6196 (1996).
28. "Energy transfer in classical trajectories of atom-diatom molecule collisions." **Hamzeh M. Abdel-Halim** and Badria Al-Shihi. *Indian J. Chem.* **35A**, 366 (1996).

29. "A New Model to Evaluate the Activity Coefficient of Strong Electrolytes in Aqueous Solutions." **Hamzeh M. Abdel-Halim**, *Asian J. Chem.* **6**, 370 (1994).
30. "A New Model for the Calculation of Thermodynamic Functions of Simple Salts in Aqueous Solutions." **Hamzeh M. Abdel-Halim**. *Asian J. Chem.* **6**, 592 (1994).
31. "Kinetics of Amino Acids Oxidation by Alkaline Transition Metal Complexes." **Hamzeh M. Abdel-Halim** and Yasmeen Al-Lawatia. *Asian J. Chem.* **6**, 655 (1994).
32. "Synthesis and nonlinear optical properties of some substituted ruthenium (II)  $\eta^5$  - cyclopentadienyl  $\eta^5$  - or  $\eta^6$  - arene salts." Masaru Kimura, **Hamzeh M. Abdel-Halim**, Dean W. Robinson and Dwaine O. Cowan. *J. Organomet. Chem.* **403**, 365 (1991).
33. "Hyperpolarizabilities of 4-amino-4'-nitrodiphenyl sulfide and all of its chalcogen analogues." D.W. Robinson, **Hamzeh M. Abdel-Halim**, S. Inoue, M. Kimura and D.W. Cowan. *J. Chem. Phys.* **90**, 3427 (1989).
34. "Desirable Route to Heterodimers of 1,4-Dihalobenzenes and Anthracene and Their Photoproperties and Thermal Properties." Masaru Kimura, **Hamzeh M. Abdel-Halim** and D.O. Cowan. *J. Org. Chem.* **53**, 3908 (1988).
35. "Preliminary Study of the Nonlinear Optical Properties of 4-Amino-4'-nitrodiphenyl Sulfide." **Hamzeh M. Abdel-Halim**, D.O. Cowan, D.W. Robinson, F.M. Wiygul and M. Kimura. *J. Phys. Chem.* **90**, 5654 (1986).
36. "Temperature Dependence of Vibrational Energy Transfer in Liquids: V-V Relaxation of CO( $v = 1$ ) by O<sub>2</sub> in Liquid Ar From 86 to 145 K." Donald W. Lupo, **Hamzeh M. Abdel-Halim** and George E. Ewing. *Chem. Phys.* **104**, 455 (1986).
37. "Vibrational energy transfer between CO and CH<sub>4</sub>, CD<sub>4</sub>, and CF<sub>4</sub> in liquid Ar." **Hamzeh M. Abdel-Halim** and George E. Ewing. *J. Chem. Phys.* **82**, 5442 (1985).

## II) Manuscripts submitted (not yet published), or under preparation, for publication:

1. Kinetics of oxidation of Atropine by  $K_2Cr_2O_7$  in Acidic Aqueous Solutions  
**Hamzeh M. Abdel-Halim**, Abdullah I. Saleh and Sanad K. Al-Ghreizat.
2. "A Highly Selective Colorimetric Cyanide Sensor in Aqueous Solutions",  
Yousef M Hijji, BelygonaBarare ,**Hamzeh M. Abdel-Halim**, Musa I. El-Barghouthi, , Hutaf M. Baker. Submitted for publication.
3. "Second harmonic generation of 4-Amino-4'-Nitrodiphenyl sulfide SAM on Ag(111) surface." **Hamzeh M.A-H.**, H.M. Baker. Submitted for publication.
4. "Comparative studies of the adsorption of cysteamine, mercaptopropionic acid and L-cysteine on Ag(111)." L.B. Avalle, **Hamzeh M.A-H.**, H.M. Baker, H. Jones and E. Santos. Under preparation.
5. "Effect of phenyl substitution on second harmonic generation of self-assembled monolayers on Ag(111)." **Hamzeh M.A-H.**, H.M. Baker, L.B. Avalle, H. Jones and E. Santos. Under preparation.

## III) Ongoing Research Projects:

1. "Kinetics of Nucleophilic Substitution Reaction of Pyrazole Derivative with Substituted Hydrazines."
2. "Quantum Mechanical Calculation of Vibrational - Translational Energy Transfer Between Diatomic Molecules".
3. "Theoretical Calculations of Second Order Hyperpolarizability Constant ( $\beta$ ) of Non-Linear Optical Molecules".

