

**Dr. ALI EL-RAYYES**

*An accomplished & knowledgeable professional  
aiming for excellence in chemistry teaching and research.*



### **PERSONAL DETAILS**

Date of Birth: 9<sup>th</sup> January, 1970

Present Address: Arar, Ibn Abi Al-ataa Street, Saudi Arabia

Permanent Address: EL-Mattaria-Dakhlia, Azzam Street, Egypt

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### **ACADEMIC CREDENTIALS**

- **Ph.D.** (Chemistry) from King Fahd University of Petroleum and Minerals with GPA: 3.8/4 in 2001
- **M.Sc.** (Computational Chemistry) from King Fahd University of Petroleum and Minerals with (GPA: 3.7/4) in 1997
- **B.Sc.** (Chemistry) from Faculty of Science, Mansoura University (Dist. with a very good grade) in 1992

### **Working EXPERIENCE**

*Sept. 2024 – now: Associate Professor,  
March'18 – August 2024: Assistant Professor,  
Northern Border University, Arar  
College of Science, Chemistry Department.  
Research and teaching of undergraduate courses lecture & lab*

*Feb'06 – to Sept 2016: Afia International Company, Jeddah  
Feb'06 – Nov'06: Supply Chain Capabilities Developments Manager  
Dec'06 – Dec'08: Dept. Manager -Process Control  
Jan'09 – Dec'13: Dept. Manager - Process Control, Harbor & Oil Logistics  
Jan'14 – Sept 16: Plant operations manager*

*Sep'01 – Jan'06: Research Associate.*

*King Fahd University of Petroleum & Minerals*

*Research and teaching of undergraduate courses lecture & lab*

*1997 – 2001: Lecturer-B*

*King Fahd University of Petroleum & Minerals*

*Teaching & studying for my PhD degree*

*1995 – 1997: Research Assistant*

*King Fahd University of Petroleum & Minerals as*

*Teaching & studying for M.Sc. degree*

*1993 – 1994: Research Assistant*

*Faculty of Science, Mansoura University as*

## **LIST OF PUBLICATIONS**

- 1) **Ali El-Rayyes**, Ibrahim Arogundade, Abimbola A. Ogundiran, Mohamed Hefnawy , Edwin Andrew Ofudje and Ali El Gamal, "Hot-Water Treated Cow Waste As Potential Adsorbent For Cresol Red And Chromium Vi Removal From Aqueous Solution", Bioresources, Submitted Nov. 2024.
- 2) **Ali El-Rayyes**, Safwat A. Mahmoud, Wael I. Mortada, "Micelle-Mediated Extraction Combined With The Adsorption Onto Magnetic Nanoparticles For The Extraction Of Crystal Violet From Wastewater", Bull. Chem. Soc. Ethiop., Submitted, 2024.
- 3) Ahmad Ayyaz, **Ali El-Rayyes**, Hafiz Irfan Ali, Imen kebaili, M. Basit Shakir, Imam Saheb Syed, Q. Mahmood, "Study of Electronic, Optical, and Thermoelectric Aspects of Double Perovskites Rb<sub>2</sub>TlAsX<sub>6</sub>(X= Cl, Br) for Green Energy Applications: A DFT Approach ", Journal of the Korean Ceramic Society, **Accepted 2024**.
- 4) Cecep Suhandi, Gofarana Wilar, Angga Cipta Narsa, Ahmed Fouad Abdelwahab Mohammed, **Ali El-Rayyes**, Muchtaridi Muchtaridi, Shaharum Shamsuddin, Sabreena

Safuan, Nasrul Wathoni, " Updating the Pharmacological Effects of  $\alpha$ -Mangostin Compound and Unraveling Its Mechanism of Action: A Computational Study Review", *Drug Design, Development and Therapy*, 2024:18, 4723–4748

5) Ayatulloh Alquraisy, Gofarana Wilar, Ahmed Fouad Abdelwahab Mohammed, **Ali El-Rayyes**, Cecep Suhandi, Nasrul Wathoni, "A Comprehensive Review of Stem Cell Conditioned Media Role for Anti-Aging on Skin", *Stem Cells and Cloning: Advances and Applications*, 2024:17, 5–19.

6) E. M. Abbass, **Ali El-Rayyes**, A. K. Ali, A. F. El-farragy, A. K. Piekarz, R. M. Ramadan, "Catalyzed syntheses of novel series of spiro thiazolidinone derivatives with nano Fe<sub>2</sub>O<sub>3</sub>: Spectroscopic, X-ray, Hirshfeld surface, DFT, biological and docking evaluations " *Scientific reports*, **Scientific Reports** 14 (1), 18773.

7) N. Wathoni, Y. Herdiana , C. Suhandi, A. F. Abdelwahab, Ali El-Rayyes, A. Cipta Narsa "Advancements and Challenges of Nanostructured Lipid Carriers for Wound Healing Applications " *International Journal of Nanomedicine*, 2024, 8091-8113.

8) Ahmad Ayyaz, Samah Saidi , Hafiz Irfan Ali , Afaf Khadr Alqorashi , Imen Kebaili ,**Ali El-Rayyes**, Q. Mahmood "Exploring physical characteristics of double perovskites Na<sub>2</sub>CuAsX<sub>6</sub> (X = F,Cl, Br, and I) for solar energy harvesting and wasted heat recovery applications ", *Materials Science and Engineering B* 308 (2024) 117583

9) Yahaya Saadu Itas· Amnah Mohammed Alsuhaibani · Moamen S. Refat · **Ali El-Rayyes** · Mazen R. Alrahili "Studies of Gamma Ray Shielding Properties of Lead-Free Tungsten-Borate-Tellurite Glasses (xWO<sub>3</sub>-20B<sub>2</sub>O<sub>3</sub>-(80 – x)TeO<sub>2</sub>); (x = 10,15, 20 and 25) ", *Journal of Electronic Materials*, 2024, <https://doi.org/10.1007/s11664-024-11262-y>

10) K. Khan, M. Ikram, A. Haider, A. Ul-Hamic, G. Ali, S. Goumri-Said, M. B. Kanoun, S. A. Yousaf, **Ali El-Rayyes**, M. Jeridi, "Experimental and computational approach of zirconium and chitosan doped NiCo<sub>2</sub>O<sub>4</sub> nanorods served as dye degrader and bactericidal action " *International Journal of Biological Macromolecules* 272 (2024) 132810.

11) Yasmen Osama, Ehab Abdel-Latif, Heba M. Metwally, **Ali El-Rayyes**, and Tamer K. Khatab, "Green synthesis of zinc oxide NPs as a new catalyst for the synthesis of

imidazo[2,1-b]quinazoline derivatives with docking validation as aurora kinase (AKI-001) inhibitor”, *Current Organic Chemistry*, **2024**, *28*, 1215-1223.

**12)** Yahaya Saadu Itas , Mohammed Muktar Nono, M. Khalid Hossain , Ibtahaj Alshdoukhi, Amnah Mohammed Alsuhaibani , Moamen S. Refat , **Ali El-Rayyes**, “Envisaging the energy and quantum capacitance in modified silicene: A DFT studies”, *Journal of Energy Storage*, **98** (**2024**) 113051

**13)** A. Ayyaz, G. Murtaza, M. Hussain, M. B. Shakir, **Ali El-Rayyes**, A. K. Alqorashi, I. kebaili, H. I. Ali, Q. Mahmood, “DFT Insight on Future Prospects of Double Perovskites  $A_2YZuZ_6$  ( $A=Rb, Cs$  and  $Z=Cl, Br$ ) for Energy Conversion Technologies”, *J. Inorganic and Organometallic Polymers and Materials*,**2024**, <https://doi.org/10.1007/s10904-024-03170-9>.

**14)** N. Wathoni, Y. Herdiana , C. Suhandi, A. F. Abdelwahab, **Ali El-Rayyes**, A. Cipta Narsa , “Chitosan/Alginate-Based Nanoparticles for Antibacterial Agents Delivery”, *International Journal of Nanomedicine*, **2024**:19 5021–5044

**15)** Y. S. Itas, R. Haldhar, A. M. Alsuhaibani, M. S. Refat, **Ali El-Rayyes**, M. R. Alrahili “ New trends in gamma ray shielding features of silicate tellurite glass using cerium oxide nanoparticles reinforcement ( $xCeO_2-20SiO_2-(80-x)TeO_2$ ); ( $x = 10, 15, 20$  and  $25$ ) “, *Optical Materials* **153** (**2024**) 115605, DOI: [10.1016/j.optmat.2024.115605](https://doi.org/10.1016/j.optmat.2024.115605)

**16)** Ahmad Ayyaz, G. Murtaza, Ahmad Usman, M. Basit Shakir, Maha Naeem, **Ali El-Rayyes** ,Imed Boukhris , Hummaira Khan “ DFT aided comparative screening of mechanical, optoelectronic, and transport properties of double perovskites  $Cs_2ScAuX_6$  ( $X = Cl, Br,$  and  $I$ ) for green energy applications “, *Inorganic chemistry commun.*, **165** (**2024**) 112527 <https://doi.org/10.1016/j.inoche.2024.112527>

**17)** Fatima S. Mehdhar, Ali Saeed, Ehab Abdel-Latif, Ebrahim Abdel-Galil, **Ali El-Rayyes**, and Ghada E. Abdel-Ghani, “Synthesis, Biological Evaluation, and Docking Study of a Novel Series of Thiophene Derivatives Based on 3-Oxobutanamidothiophene as an Anticancer Assessment”, *ChemistrySelect* **2024**, **9**, e202400579. <https://doi.org/10.1002/slct.202400579>

**18)** Jamiu M. Jabar , K. Al-Ahmary , I. Alshdoukhi , A. Alghamdi, **Ali El-Rayyes** , M R. Alrahili, “ Cashew (*Anacardium occidentale* L) bark extract for eco-safe dyeing

of mordanted cotton fabric: Colorimetric and biomedical functional properties”, *Sustainable Chemistry and Pharmacy* 39 (2024) 101587, <https://doi.org/10.1016/j.scp.2024.101587>.

19) Ali A. El-Rayyes “DFT studies of the geometry, electronic structure and vibrational spectra of some 1,3-Benzothiazole derivatives”, *J. North for applied and basic science*, **Accepted 2024**.

20) Heba M. Metwally, Norhan. M. Younis, Ehab Abdel-Latif, Ali El-Rayyes “New Thiazole, Thiophene and 2-Pyridone Compounds Incorporating Dimethylaniline Moiety: Synthesis, Cytotoxicity, ADME and Molecular Docking Studies” *BMC Chemistry*, (2024) 18:52. <https://doi.org/10.1186/s13065-024-01136-z>

21) Ali A. El-Rayyes, A. M. Elbasiony, Ehab Abdel-Latif, Safa A. Badawy, “Co-Sensitization Cocktail with Methylfuran Dyes Catapults Photovoltaic Performance: Nearly 50% Boost over Standard N719”, *Optical Materials* 149 (2024) 115150

22) Cszahreylora Vitamia, Ghina Nadhifah Iftinan, Irma Rahayu Latarissa, Gofarana Wilar, Arief Cahyanto, Ahmed Fouad Abdelwahab Mohammed, Ali El-Rayyes, Nasrul Wathoni, “ $\alpha$ -Mangostin Hydrogel Film with Chitosan Alginate Base for Recurrent Aphthous Stomatitis (RAS) Treatment: Study Protocol for Double- Blind Randomized Controlled Trial”, *Frontiers in Pharmacology*, V 15 –2024, <https://doi.org/10.3389/fphar.2024.1353503>.

23) Yunusa Umar and Ali A. El-Rayyes “ Theoretical investigation of the vibrational and electronic properties of tetraphenylammonium and its boron, aluminum, gallium, carbon, silicon, germane, phosphorus and arsenic analogues”, **Computational and Theoretical Chemistry** 1231 (2024) 114423.

24) Cecep Suhandi, Ahmed Fouad Abdelwahab Mohammed, Gofarana Wilar, Ali El-Rayyes, Nasrul Wathoni, “Effectiveness of Stem Cell Secretome on Wound Healing: A Systematic Review and Meta-Analysis”, *J. Tissue Engineering and Regenerative Medicine*, 2023. <https://doi.org/10.1007/s13770-023-00570-9>.

25) Safwat A. Mahmoud, Ali El-Rayyes, Shahenda S. Ahmed, Mohamed S. Attia “Procalcitonin assessment by using optical sensor terbium hydrochlorothiazide complex for early diagnosis of lung cancer” *Microchemical Journal* 193 (2023) 109051

- 26) **Ali El-Rayyes**, Roaa T. Mogharbel, Mohammed H. Abdel-Rahman, Mohamed A. Ismail, Ehab Abdel-Latif, "Molecular geometry and biological activity of 2-(4-substituted phenylimino) thiazolidin-4-one compounds", *Bull. Chem. Soc. Ethiop.*, **2023**, *37*(5), 1275-1286..
- 27) Altaf Saleh, Ali Saeed, Ghada E. Abdel-Ghani, **Ali El-Rayyes**, Ehab Abdel-Latif, "synthesis of some new antipyrine-thiophene hybrids and evaluating their antioxidant and antibacterial activities", *Bull. Chem. Soc. Ethiop.* **2023**, *37*(1).
- 28) Altaf S. Almatari, Ali Saeed, Ghada E. Abdel-Ghani, **Ali El-Rayyes**, Ehab Abdel-Latif, "Synthesis of some new thiophene, thienyl-thiazole and thienyl-benzofuran analogues and evaluation of their anticancer ractivity. *Journal of Heterocyclic Chemistry*, **2023**;1–13.
- 29) Mohamed R. Elmorsy, Safa A. Badawy, Abdullah Y. A. Alzahrani and **Ali El-Rayyes**, "Molecular design and synthesis of acetohydrasonoyl cyanide structures as efficient dye-sensitized solar cells with enhancement of the performance of the standard N-719 dye upon co-sensitization", *Optical Materials*, **135** (2023) 113359. <https://doi.org/10.1016/j.optmat.2022.113359>
- 30) **Ali El-Rayyes**, Ehab Abdel-Latif, Ahbarah M. Soliman, and Ali Saeed "Synthesis and Anticancer Evaluation of New Thiazole and Thiadiazole Derivatives Bearing Acetanilide Moiety", *Russian Journal of General Chemistry*, **2022**, Vol. *92*, No. *10*, pp. 1–13.
- 31) **Ali El-Rayyes** and Mohamed R. Elmorsy, "New 3-aryl-2-cyano-acrylohydrazide compounds as effective sensitizers for dye-sensitized solar cells: Photovoltaic performance over the standard dye N719 upon co-sensitization", *Optical Materials* **132** (2022) 112866, <https://doi.org/10.1016/j.optmat.2022.112866>.
- 32) **Ali A. El-Rayyes** and Yunusa Umar " Theoretical study on intramolecular hydrogen bonding and proton transfer reactions in 8-hydroxy-1-naphthaldehyde", *Bulletin of the Korean Chemical Society*, **42**, (2021), 1310–1318 DOI: [10.1002/bkcs.12367](https://doi.org/10.1002/bkcs.12367)
- 33) I. H. El Azab, H. Kh. Thabet, Sh. A. Almotairi , M.G.A. Saleh , R.T. Mogharbel , S.A. Mahmoud , A .A. El-Rayyes, A. Ibrahim, M. Sh. Zoromba , M.H. Abdel–Aziz , S.M. Ibrahim , A.F. Al-Hossainy " Novel Synthesis and High Performance of a novel nanocomposite of

coumarin thin film with [ZrO<sub>2</sub>]<sup>NPs</sup> and its application", *J. Mol. Struct.*, **1241** (2021) **130640**. <https://doi.org/10.1016/j.molstruc.2021.130640>

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**34)** El-Rayyes, A. Al-Betar, T. H. Maung, and Uwe K. A. Klein\*. "Fluorescence emission from Rhodamine-B Lactone adsorbed at solid catalysts" *Chem. Phys. Lett.*, **414**(2005)287-291.

**35)** Ali A. El-Rayyes\*, Yunusa Umar "Density Functional Theoretical studies on Structures and Vibrational Spectra of Fluorovinyl Silanimines" *The Canadian Journal of Analytical Sciences and Spectroscopy (CJASS)*, **50**(2005)175-189.

**36)** Ali A. El-Rayyes, T. H. Maung\*. "Excited state Phototautomerization of 8-amino-1-naphthol-3, 6-disulfonate in polar and acidic solutions" *The Canadian Journal of Analytical Sciences and Spectroscopy (CJASS)*, **50**(2005)111-118. (WOS:000202944700007)

**37)** Al-Betar, A. El-Rayyes and Uwe K. A. Klein\*. "Ground and Excited states proton transfer reactions of 1, 8-diaminonaphthalene in Perchloric acid solutions" *J. Fluorescence*. **15**(2005)689-696.

**38)** Ali A. El-Rayyes, Klein, Uwe K. "Acidity Characterization of Tungstophosphoric Acid by using Laser Induced Fluorescence Spectroscopy" *Chem. Phys. Lett.*, **397** (2004) 484-487.

**39)** Mohamed I. M. Wazeer\*, Anvarhusein A. Isab and Ali El-Rayyes, "Solid state NMR study of 1,3 -imidazolidine-2-thione, 1,3-imidazolidine - 2-selenone and some of their N-substituted derivatives" *Spectroscopy*, **18** (2004) 113-119.

**40)** Ali A. El-Rayyes, A. Al-Arfaj, Klein, Uwe K. A., Barri, S.A.I\* "Acidity of all-silica MCM-41 - studied by laser spectroscopy of adsorbed fluorescent probe compounds" *Catal. Lett.* **97** (2004) 83-90.

**41)** Ali A. El-Rayyes, T. H. Maung\* "Solvents effect on the Photophysical Properties of 2-anilinonaphthalene" *Spectrochim Acta Part A.*, **60** ( 2004) 1985-1989.

**42)** Ali A. El-Rayyes\*, T. H. Maung. "Theoretical studies on the structure and hydrogen bonding of 8-amino-1-naphthol and its one water complex" *J. Mol. Struct. THEOCHEM*, **681** (2004) 9-13.

- 43) **Ali. A. El-Rayyes\*** "Theoretical Studies on the Geometrical Structures and Vibrational Spectra of N-hydroxy-1-vinylsilanimines" *J. Mol. Struct. (Theochem)*, 624(2003)181-190.
- 44) **Ali. A. El-Rayyes\*** "Structure and vibrational assignments of the various modes of Nitro-, Nitroso- and Aminosilanimines" *J. Mol. Struct. (Theochem)*, 634(2003)289-298.
- 45) **Ali A. El-Rayyes**, H.P. Perzanowski, Klein, Uwe K. A., Barri, S. A. I\*. "Acidity of zeolite Y-Probed by adsorption of 1-Naphthylamine and studied by laser-induced fluorescence spectroscopy" *Catal. Lett.*, vol 78, 161(2002).
- 46) **Ali. A. El-Rayyes\*** "Ab initio and Density Functional Theoretical Studies of Structures and Vibrational Spectra of Simple Silanimines" *J. Mol. Struct. (Theochem)*, 617(2002)17-29.
- 47) H. M. Badawi & **Ali. A. El-Rayyes** "Vibrational Spectra and Potential Energy Distributions of Normal Modes of 3-Nitroso- and 3-Nitrocyclopropene" *J. Mol. Struct. (Theochem)*, 588(2002)17-27.
- 48) **Ali A. El-Rayyes**, H.P. Perzanowski, Barri, S. A. I., Klein, Uwe K. A\*. "New Insight Into The Excited State Proton Transfer Reactions Of 1-Naphthylamine In Solution" *J. Phys. Chem. A.*, Vol 105, 10169(2001).
- 49) H. M. Badawi, **Ali. A. Al-Rayyes** "An Ab Initio Calculations of Barrier to Internal Rotation in 3-Methyl-3-Cyclopropenecarboxaldehyde and 3-Methyl-3-Cyclopropenecarboxylic Acid Fluoride" *Arab. J. Sc. Eng.*, Vol. 24A, 59(1999).
- 50) H. M. Badawi\*, and **Ali. A. Al-Rayyes** "An Ab Initio Study of the Effect of solvent on energies and Rotational Barrier In 2,3-butadienal and 2,3-butadienoyl Fluoride and Chloride" *J. Mol. Struct. (Theochem)* Vol. 428, 247(1998).
- 51) H. M. Badawi, W. Forner & **Ali. A. Al-Rayyes** "An Investigation of Structural Stability and Internal Rotation in 3-Cyclopropenecarboxaldehyde and 3-Cyclopropenecarboxylic Acid Fluoride by Ab Initio Calculation" *J. Mol. Model.* Vol. 4, 158 (1998).
- 52) H. M. Badawi & **Ali. A. Al-Rayyes** "Rotational Barrier in 3-Butynal and 3-Butynoyl Fluoride and Chloride Based on Ab Initio Calculations" *J. Mol. Struct. (Theochem)* Vol. 397, 51(1997).



53) H. M. Badawi, **Ali. A. Al-Rayyes** and C. P. Tsonis, "An Ab Initio Study of Structural Stability of Poly (Phenylacetylene) Dimers and Trimers" J. Mol. Struct. (Theochem) Vol. 394, 49 (1997).

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### **TEACHING ASSIGNMENTS**

**Efficiently taught lectures, Labs and recitations of the following courses:**

- General chemistry I
- General chemistry II
- Electrochemistry, NBU
- Photochemistry, NBU
- Chemical Kinetics, NBU
- Experimental Physical Chemistry, NBU
- Quantum Chemistry, NBU
- Corrosion Chemistry, NBU
- Chemical Industries, NBU.
- Solid state and surface chemistry
- Catalysis
- Pharmaceutical Analytical Chemistry, NBU
- Pharmaceutical Organic Chemistry I,
- Pharmaceutical Organic Chemistry II, NBU
- Pharmaceutical Quality Control, NBU
- General Chemistry (Chem 101) KFUPM
- General Chemistry (Chem 102) KFUPM

### **PROFESSIONAL ENHANCEMENTS**

**Successfully completed full training course on:**

- Computer for Chemists, Short Course, Chemistry Department, KFUPM, 1996
- Introduction to UNIX, Short Course, Information Technology Center, KFUPM, 1997

- Instructional Technology, Workshop, Academic Development Center, KFUPM, November 4-8, 2000
- How to be an Effective University Teacher, Workshop, Academic Development Center, KFUPM, September 7-8, 2002
- Increasing Effectiveness as a University Teacher, Workshop, Academic Development Center, KFUPM, September 9-11, 2002
- "Total Quality Management, TQM" at the King Fahd university of Petroleum and Minerals
- OHSAS 18000 and was qualified as an OHSAS & HACCP Internal Auditor
- ISO 22000:2005 (Food Safety Management Systems) and was qualified as an Internal Auditor
- ISO 14001 and was qualified as an internal "Environmental Management Systems EMS" Auditor
- "Managing Multiple Tasks"
- "Managing People Concepts"
- "Train the trainers" - A Certified Trainer
- "Total Production Maintenance" TPM Training
- "Change Management" Training Course held at Bahrain, July 2006.

SKILLS SET	PROFILE SUMMARY
<p style="text-align: center;"><b>Teaching</b></p> <p style="text-align: center;"><b>Research &amp; Development</b></p> <p style="text-align: center;"><b>TQM (lean manufacturing)</b></p> <p style="text-align: center;"><b>Quality Assurance &amp; Control</b></p> <p style="text-align: center;"><b>Manufacturing Operations</b></p>	<ul style="list-style-type: none"> <li>➤ A competent professional with 16 years of experience Academic teaching &amp; research, Quality Assurance &amp; Control, Process Improvements, and Lean Manufacturing</li> <li>➤ Computational Chemistry and chemical reactions modelling</li> <li>➤ Experience in interpreting data from various spectrophotometers e.g. Uv-Vis, IR, Fluorescence and Pico-second Laser spectrophotometer</li> <li>➤ An effective communicator with good analytical, leadership, interpersonal, planning and problem-solving skills</li> <li>➤ Proficient in developing &amp; streamlining systems with pro</li> </ul>

<b>Process Enhancement</b>	ability to enhance operational effectiveness and meet operational goals within the cost, time & quality parameters
<b>Chemical analysis</b>	➤ Skilled in providing support to QA, Operations & process management teams to implement food safety and QMS like ISO 9001 & ISO 22000
<b>Cost Control</b>	➤ Possess a clear understanding of industry, technology trends with distinction of instituting quality control techniques to achieve excellence at the lowest overall costs
<b>Team Management</b>	➤ Instrumental in process operation optimization & GMP

### **THESIS**

#### **Successfully completed thesis on:**

- “Study of the Photochemical Properties of Some Organic Compounds on Molecular Sieves by using a Pico-second Pulse Laser System” during Ph.D.
- “Conformational Stability and Barrier to Internal Rotation in Some Unsaturated Hydrocarbons Based on AB Initio Calculations” during M.Sc.

### **KNOWLEDGE PURVIEW**

#### **Well versed with:**

- Catalysts Characterization using Laser induced fluorescence spectroscopy.
- Analysis of food additives and contaminants using different spectroscopic and chromatographic methods of analysis
- Dynamics of the excited state proton transfer reactions
- Computational Chemistry and chemical reactions modelling
- Sound knowledge of:
- Solid catalyst properties like acidity & polarity by inclusion of a probe molecule into catalyst channels & cages and measuring its fluorescence and excited state lifetime.

- Analysis and identification of compounds using GC, GC-MS and HPLC and many other spectroscopic methods.
- Computational Studies on ground & excited states of chemical reactions

### **CORE COMPETENCIES**

- Conducting chemical analysis and identifying materials using GC, GC-MS & HPLC and using many other spectroscopic techniques, (UV-Vis, FT-IR, Fluorescence, atomic absorption, .....)
- Managing day-to-day operations with a talent for formulations, quality assurance and QMS implementation in line with industry best practices
- Undertaking HACCP & quality systems implementation and ensuring improvements in the refineries & production sections
- Establishing an acidity & polarity scale for solid catalysts based on the lifetimes of an adsorbed probe molecule
- Managing & leading teams for running successful operations for achieving manufacturing excellence
- Implementing cost saving measures to develop manpower skills, safety measures and ensuring compliance of various quality measures
- Responsible for the factory - industrial waste disposal & management
- Developing new process concepts for production optimization, yield improvement and developing guidelines for the sequencing of manufacturing activities
- Focusing on the optimization of process parameters & initiating process improvements for achieving productivity targets

### **FUNDED RESEARCH PROJECTS**

**Project #SAB-2002/05**

- “Quality Tests of Widely Used Vegetable Oils in Saudi Arabia by different electron spectroscopy techniques”, M.A. Morsy (PI) and Ali El-Rayyes (CoI) (Dec 2002-Dec. 2003); Final report is submitted & approved (with evaluation of Excellent)

**Project #SAB-2003/05**

- “Photochemical Studies on 8-Amino-1-Naphthol-3, 6-Disulfonate by Fluorescence Spectroscopy” by Than Htun (PI) and Ali El-Rayyes (CoI) (April 2003-April. 2004); Final report is submitted and approved (with evaluation of Excellent)

**Project #SAB-2004/16**

- “Acidity Characterization of Solid Acids by Using the Excited State Proton Transfer Reactions of Aromatic Amines” by Ali El-Rayyes (PI), (June 2004-Nov. 2005); Final report is submitted and approved (with evaluation of Excellent)

### **DISSERTATION ABSTRACT**

**Abstract:** Proton transfer reaction from excited state of 1-naphthylamine ( $\text{RNH}_2$ ) has been investigated in aqueous solutions of different acidity. Fluorescence from a new species was recorded. The quenching constants of:  $\text{RNH}_2^*$ ,  $\text{RNH}_3^{+*}$  & new species and some rate constants are evaluated by means of steady-state fluorescence and picosecond fluorescence decay measurements. The structure of the new emitting species was proposed to be an adduct formed from  $\text{RNH}_3^+$  and an unhydrated  $\text{ClO}_4^-$  anion. A theoretical model for the hydration of protons was presented. The formation of the new species was found to be in linear relationship to the presence of un-hydrated acid molecules.

The results of study were used to characterize the acidity in zeolite Y & MCM-41 catalysts. Both fluorescence emission & fluorescence decay profile of RNH<sub>2</sub> adsorbed at catalyst surfaces reflect high acidic environment experienced by the amine at the surfaces of the catalyst. For zeolite Y, acidity was found to be equivalent to that in 3 M acid and increases up to 17 M by increasing the percent protonation in the catalyst. For MCM-41, the pH of the surface silanol groups was found to vary from pH 1.8 to pH 2.5. Kinetic models for the proton transfer reaction occurring at the catalyst surfaces was proposed and both fluorescence & deactivation rate constants are determined. Furthermore, the polarity of surfaces of these catalysts is probed using 2-anilinonaphthalene (2-AN) and rhodamine b lactone (RBL). The results show that the catalyst surfaces are highly polar. The polarity could be comparable to that of an alcohol. For zeolite Y, polarity increases upon protonation. A new fluorescence emission band from RBL adsorbed at the zeolite Y surfaces was determined. This emission band is due to a dimer formation at the catalyst surfaces. This band was not formed in solutions due to solvation effects. To our knowledge, this was first time to characterize the surface properties using laser induced fluorescence techniques and to study excited-state proton transfer reactions at the surfaces of zeolite Y and MCM-41 materials.

## **REFERENCES**

### **Prof. Safwat AbdulHalim Mahmoud**

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