THE FUTURE OF CHEMICAL SCIENCE : EXPERT PERSPECTIVES FROM SADIA TASNIM

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Online Desk : As global investment in biomedical research, pharmaceutical innovation, biotechnology, and food-system safety expands, the role of highly skilled chemists becomes increasingly vital to scientific progress worldwide.

Sadia Tasnim is an accomplished analytical chemist whose work spans pharmaceutical quality control, computational drug-design modeling, and food-system chemistry. With a strong foundation in advanced laboratory instrumentation—including HPLC, UPLC, GC, FTIR, and stability-analysis methods—she has contributed to fields that rely heavily on chemical accuracy, safety assurance, and evidence-based innovation. Her research on phytochemical therapeutics, particularly in the area of anti-diabetic compound discovery, has gained international attention for its use of molecular docking, ADMET profiling, and structure-activity modeling to accelerate early-stage therapeutic evaluation. Throughout her career in regulated laboratory environments and industrial R&D settings, Tasnim has demonstrated a capacity to integrate scientific rigor with emerging analytical technologies. Her work supports global efforts to strengthen pharmaceutical reliability, improve food-safety systems, and advance computational chemistry methodologies. Recognized for her ability to bridge research, quality assurance, and industry application, she continues to contribute to the broader scientific mission of improving product safety, enhancing therapeutic innovation, and promoting high-standards laboratory practices across multiple sectors.

Q: Can you begin by sharing a brief overview of your background and what first inspired you to pursue a career in chemistry?

From an early age, I was fascinated by how the world operates at the molecular level, and chemistry quickly became the field that connected my curiosity to real scientific understanding. As I progressed through my academic training, I developed a strong foundation in analytical methods, laboratory instrumentation, and quality-focused research. This naturally led me into roles involving pharmaceutical products, chemical analysis, and evidence-based innovation. What inspired me most was realizing that chemistry is more than theory—it directly influences public health, product safety, and scientific advancement. This realization motivated me to focus on analytical chemistry, computational modeling, and quality control, where I could apply rigorous methods to solve meaningful problems. Over time, this work has continually strengthened my passion for contributing to research that supports both scientific progress and global well-being.

Q: Your anti-diabetic research has received significant global attention. Why is this work especially important internationally?

Tasnim: Diabetes is a growing global health challenge, placing immense pressure on healthcare systems and requiring new, safer therapeutic options. My research on Mangifera indica phytochemicals contributes early molecular insights that can guide the development of plant-derived therapeutic leads. By using computational methods to evaluate toxicity, absorption, drug-likeness, and target binding, we can identify promising compounds more efficiently. This accelerates global research efforts for chronic disease management and supports innovation across diverse scientific communities.

Q. What future areas of analytical chemistry will most benefit global scientific and industrial sectors?

Tasnim: Analytical chemistry is moving toward highly sensitive detection systems, real-time monitoring, and predictive modeling. These advancements will improve the world’s ability to detect contaminants, prevent product failures, and respond to health or safety emergencies more quickly. Techniques such as miniaturized sensors, high-resolution separation methods, and machine-learning-enhanced analytics will elevate quality standards in pharmaceuticals, food production, environmental protection, and biotechnology across the globe.

Q. How do you see computational drug-design evolving internationally in the next decade?

Tasnim: Computational drug-design will become a universal tool for early-stage discovery. AI-enhanced

models will simulate molecular interactions, toxicity profiles, metabolism, and long-term stability with increasing accuracy. This will allow researchers worldwide to evaluate thousands of compounds rapidly, accelerating breakthroughs in chronic diseases, emerging infections, rare disorders, and personalized therapies. I aim to contribute to this next generation of molecular modeling and predictive ADMET analysis.

Q. What future contributions do you hope to make in pharmaceutical quality control?

Tasnim: I plan to develop validation strategies that reduce human error, improve impurity profiling, and enhance stability-study design. My goal is to support global pharmaceutical production by strengthening reliability, minimizing product recalls, and ensuring patient safety across borders. As countries modernize their quality systems, innovative analytical frameworks will be essential for international regulatory alignment.

Q. How will your expertise support the evolution of global manufacturing and data-integrity standards?

Tasnim: Around the world, regulatory systems are moving toward digital quality controls, automated monitoring, and transparent documentation. My experience in GMP operations, calibration, and analytical workflows allows me to contribute to laboratories transitioning to advanced, data-driven models. Future compliance will depend on continuous monitoring, improved traceability, and more robust documentation systems—all areas where I aim to contribute globally.

Q. What future directions do you see for natural therapeutic compounds and anti-diabetic research?

Tasnim: As chronic diseases rise globally, natural therapeutic exploration will remain a major international research priority. I plan to broaden my computational screening to analyze diverse phytochemical groups with strong therapeutic potential. Integrating pharmacogenomic and metabolic modeling may help identify compounds suitable for varied populations worldwide, contributing to the future of precision and culturally adaptable medicine.

Q. How will you contribute to safer and more innovative food systems worldwide?

Tasnim: Food chemistry is central to global nutrition and safety. I hope to help develop advanced stability-testing methods, ingredient-verification techniques, and chemical transparency systems. These improvements will support global food producers in creating cleaner formulations, detecting adulteration early, and ensuring health-focused innovation for consumers across regions.

Q. How do you believe analytical chemists will shape the future of biotechnology internationally?

Tasnim: As biotechnology expands—into nanomedicine, advanced biomaterials, gene therapies, and bioengineered products—the demand for precise chemical characterization will increase worldwide. Analytical chemists will play a central role in verifying purity, understanding molecular interactions, validating safety, and supporting innovation hubs that drive biomedical science and sustainable technologies globally.

Q. What future goals do you have for improving laboratory reliability and scientific accuracy on a global scale?

Tasnim: Global science requires high levels of reproducibility. I plan to contribute to more reliable calibration frameworks, unified documentation systems, and standardized error-prevention strategies. These improvements will strengthen credibility, enabling scientists across different continents to collaborate effectively and produce robust, comparable results.

Q. How can your work help strengthen global pharmaceutical resilience and reduce dependency vulnerabilities?

Tasnim: Many regions aim to expand their pharmaceutical capabilities. My experience in analytical method development and quality systems can support this goal by helping laboratories achieve consistent, high-precision production. Strengthening analytical infrastructures globally will reduce reliance on limited supply chains and promote more resilient access to essential medicines.

Q. What long-term scientific impact do you aim to make at the global level?

Tasnim: My long-term goal is to help advance analytical sciences in ways that improve public health, accelerate innovation, and support scientific reliability worldwide. I want my efforts to contribute to faster therapeutic discovery, stronger quality systems, more equitable access to safe products, and a global scientific landscape strengthened by collaboration and high standards.