



## Muhammad Zeeshan Asad

### Research Student

Fossil fuels are stored sources of energy under the earth in the form of geological rocks. They have formed over millions of years due to high pressure and temperature. These fuels have been serving mankind for centuries but their excessive use in recent years has been alarming as these fuels release poisonous CO<sub>2</sub>. The uncontrolled

emission of CO<sub>2</sub> has focused the attention of researchers to work in the capturing of CO<sub>2</sub> to minimize the effects on the environment - the biggest effect is increase in temperature.

My research project is related to capturing the CO<sub>2</sub> from industries by amines and the hydrogenation of captured CO<sub>2</sub> to synthesize methanol by using heterogenous catalysts.

To ensure the globe is free from CO<sub>2</sub>, its utilization and storage must be studied and energy efficient, economical methods introduced. Two main methods have been replicated; Carbon Capture and Storage (CCS), and Carbon Capture and Utilization (CCU). The most used method is the CCU, where CO<sub>2</sub> is captured and utilized to synthesize valuable products. My main aim is to synthesize methanol by the catalytic hydrogenation of CO<sub>2</sub>. For this purpose, homogenous and heterogenous catalysts have been designed. My interest focuses on heterogenous catalysts due to the ease of synthesis and the fact that they are more economical. Most heterogenous catalysts work on temperature above 220 °C, making the process less energy efficient, but this can be minimized by designing different metallic catalysts and using some appropriate support materials.

Among various value-added products that are synthesized from the CO<sub>2</sub> capture and utilization mechanism, my main aim is to focus on the synthesis of methanol. Methanol is a very useful product for many applications including the use as fuel, additives in fuels, hydrogen storage media, carriers of energy, and similar. Most countries have seen a tremendous surge in the use methanol as a fuel.



### Post 16 Education

I completed my early education in my Home Country Pakistan with major subjects Chemistry, Physics, Biology and English. My National language is Urdu, but English is widely used.

### Higher Education:

BS in Chemistry from Gomal University  
MS from National University of Sciences and Technology (NUST) both in Pakistan.



## WHY IT MATTERS... CHEMISTRY



Loughborough  
University

### Why did you choose to research catalysis?

In my previous research for my Masters, my research work was related to Green Chemistry and Environmental Chemistry, and this fascinated me. I want to do some good for environment. I chose heterogenous catalysts for the synthesis of methanol from CO<sup>2</sup> by capture and utilization method because switching the approach towards heterogenous catalysts will make the process greener and simpler to be used in industries, also making it suitable for many cycles without losing the efficiency of reaction.

**Zeeshan's advice:** The environment is giving us enormous facilities without any charge, but we are polluting the environment continuously.

This made me choose to study Chemistry so I can work to give some relief back to the environment. Minimizing the overdependence of the population on fossil fuels, by finding some alternatives which will help minimize the pollution; this will be my small gift to the environment. Therefore, my advice is to protect the environment, conserve the water, choose sustainability, and plant more trees for the betterment of our future.

### Zeeshan's experience as a student

I feel so comfortable in the University environment because the staff are very friendly and ready to help any time. As I am Muslim, I need to offer my prayers which I offer without any hesitation, and everyone respects me. English is not my mother language, but I did not feel any difficulty communicating with anyone in the University.

The facilities in the labs are enough to do impactful research without any difficulty. Teachers are ready to help if I face any difficulty related to studies as well as research.

Besides all this the natural landscape is very beautiful to capture in the eye of camera which make me feel that I am a good photographer besides being a Chemist.

