



Nobel Prize in Chemistry 2022

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About

- ✦ Carolyn R Bertozzi, Morten Meldal and K Barry Sharpless for the development of Click Chemistry and Bioorthogonal Chemistry.
- ✦ Sharpless coined the concept of 'click chemistry'. Meldal came up with a special chemical structure called 'triazole'. Bertozzi took the next step of developing click reactions that could work inside living organisms – 'bioorthogonal' reactions (a term she coined).
- ✦ They have brought chemistry into the era of functionalism.



Carolyn R Bertozzi

Morten Meldal

K Barry Sharpless

Findings of Research

Concept of Click Chemistry

- ✦ Coined around the year 2000, it is a minimalistic form of chemistry in which molecular building blocks can quickly and efficiently snap together. It is a form of simple and reliable chemistry, where reactions occur quickly, and unwanted by-products are avoided.
- ✦ Sharpless found that instead of forcing carbon atoms, the building blocks of organic matter, to bond with each other in the process of building molecules, it's easier to link smaller molecules with complete carbon frameworks.

Azide-Alkyne Cycloaddition

- ✦ Meldal found that adding copper ions to a reaction between an alkyne and an acyl halide created a Triazole, a stable ring-shaped chemical structure that's a common building block in pharmaceuticals, dyes and agricultural chemicals.
- ✦ Azide is an N_3 (Nitride Ion) organic compound, whereas an alkyne is a hydrocarbon with at least one carbon-carbon triple bond.

Bioorthogonal Reactions

- ✦ These reactions work inside living organisms without disrupting the normal chemistry of the cell.
- ✦ Its use in combination with nanotechnology can lead to further developments in diverse areas of biomedicine, such as molecular bioimaging, targeted delivery etc.
- ✦ Bertozzi, using the work of Sharpless and Meldal, came up with an efficient and innovative method to map glycans, which are carbohydrate-based polymers made by all living organisms.
 - ✦ Bertozzi focused on glycans on the surface of tumour cells. Glycans appeared to protect tumours from the body's immune system, as they make the immune cells shut down.
 - ✦ Her bioorthogonal reactions are now contributing to more targeted cancer treatments, among many other applications.

INDIAN NOBEL PRIZE LAUREATE

Venkatraman Ramakrishnan is the only Indian to receive a Nobel Prize in Chemistry (2009). He shared the prize with Thomas A. Steitz and Ada E. Yonath for studies of the structure and function of the ribosome.



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