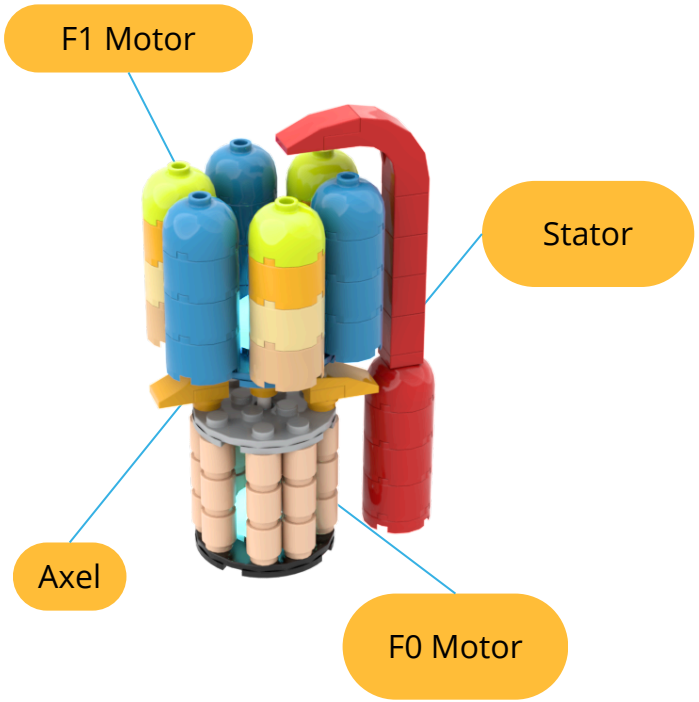
ATP-SYNTHASE

ATP-synthase is a miraculous molecular machine that acts like a motor and a generator to build up a special energy molecule called adenosine triphosphate, ATP for short. ATP molecules are the body's own battery packs, and are responsible for powering every cell in our body. From moving muscles to thinking, ATP-synthase plays a crucial role in generating the energy needed for everything our cells help us do.

ATP-synthase has two motors, called F0 and F1, which work together to make ATP. In humans, the F0 motor is embedded in the mitochondrial membrane. Mitochondria is one of the cell's most important organelles, famously known as the powerhouse of the cell for its role in energy-production.



There is a constant flow of hydrogen ions across the mitochondrial membrane, known as protons. These protons pass through the F0 motor causing its rotor to spin, much like an electric motor in a car!

This rotor is connected to the F1 motor. Because the two motors are connected by a structure known as the stator, the spinning rotor in the F0 motor causes the F1 motor to turn. When the F1 motor begins to spin, it begins to generate ATP. This is done through a chemical process.

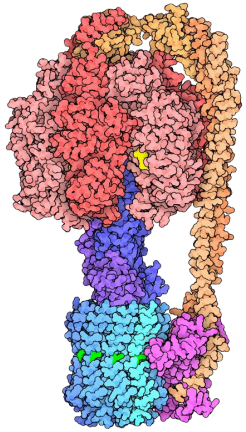
In our cells, the F0 motor uses energy from protons to make the F1 motor act like a generator to create ATP. This process happens constantly in our cells, keeping us powered up.

TO SEE A MOLECULE

.

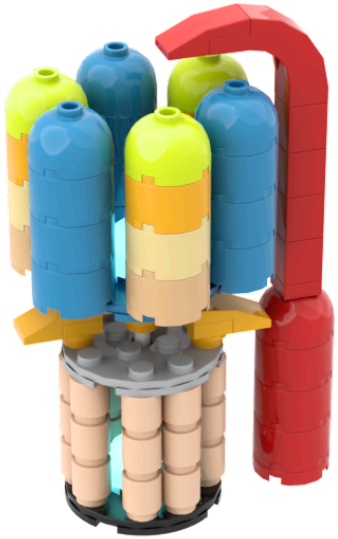
Molecules are extraordinarily small. In the tiny dot in the line above, there are over a hundred million molecules. They are so small that you can't even see them with a microscope. To find out what molecules look like, researchers use different techniques. The main ones are X-ray crystallography, cryo-electron microscopy and NMR spectroscopy.

Small-angle X-ray scattering (SAXS) is another analytical tecnqiue which measures the intensities of X-rays that are scattered from a sample to characterise its structure. SAXS provides information on a sample's particle shape, nano-particle size distribution, specific surface area and much more.



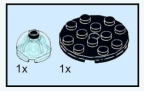
BUILD A MOLECULE

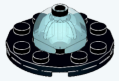
ATP-SYNTHASE



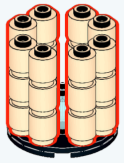
UNIVERSITY OF COPENHAGEN
INTEGRATIVE STRUCTURAL BIOLOGY CLUSTER

1

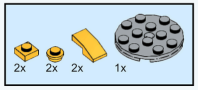


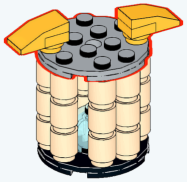


2

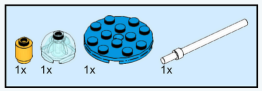


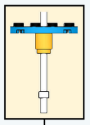
3

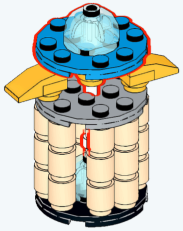




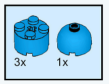
4

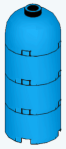


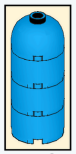




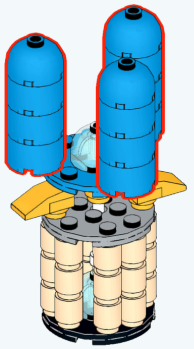
5



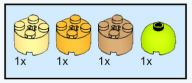


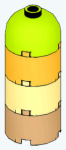


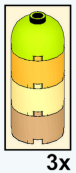
6



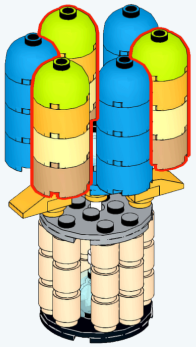
7



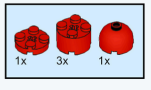


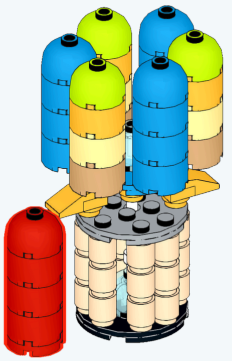


8

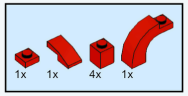


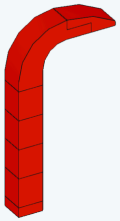
9

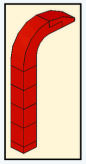
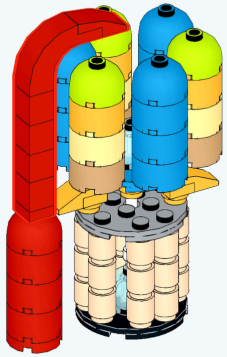




10







11