

Chemistry in the Cold



Credit: <http://www.freenaturepictures.com/snow-pictures.php>

In order to react, atoms must collide with one another. But it is so cold in space, and with such low pressures, that it's a wonder any chemistry goes on at all ...

Cold and lonely atoms

In space there are very low temperatures and very low pressures. In order to create complex molecules, atoms need to collide with one another. But the low temperatures make atoms very slow and the low pressures keep them very far apart, which makes collisions highly unlikely.

So, why have more than 120 molecules been identified in the space between the stars?

Meeting on the surface

Luckily, there is another way for chemistry to happen in space. The best way to make something happen is to get a number of atoms in one place. Atoms meet on the surface of dust grains, where 'surface reactions' create simple molecules.



A tiny interstellar dust grain

Credit: NASA

Chemistry on ice

Once these simple molecules start to gather together on the surface of dust grains, they form an icy crust. Inside the ice, much more complex molecules are formed. These complex molecules are the building blocks for creating life.