

Prospect of new two-dimensional polymer

Plastic waste is a global problem. That is not to say that it is something that can only be observed on a global level but rather the opposite. It is a problem that can be seen on a local level all across the world. From the southern remotes of Antarctica to the equator in Indonesia and local north of Sweden. While some countries could be deemed more responsible than others when it comes to the issue of plastic waste. That is also a meaningless point to discuss when it concerns global issues. Instead of focusing on who is responsible for making it a problem we should instead be taking the responsibility upon ourselves to solve the problem. A global issue may be caused by anyone but it should also be solved by everyone, as that is the very meaning of global.

In Sweden plastic waste is a major problem that everyone can observe while at the same time being a subject not often discussed. When walking in the streets or a park, plastic packaging is something that you have to actively try and avoid to not notice. A lot of people may not find it to be a problem at the forefront of utmost urgency, as the version they observe is quite different from the true problem at hand. The everyday version of the plastic waste problem in Sweden involves a couple of empty candy wrappers thrown about along the streets. Whereas the actuality of the problem comes from the fact that even a large majority of the plastic waste that makes it to a recycling plant does not actually end up being recycled.

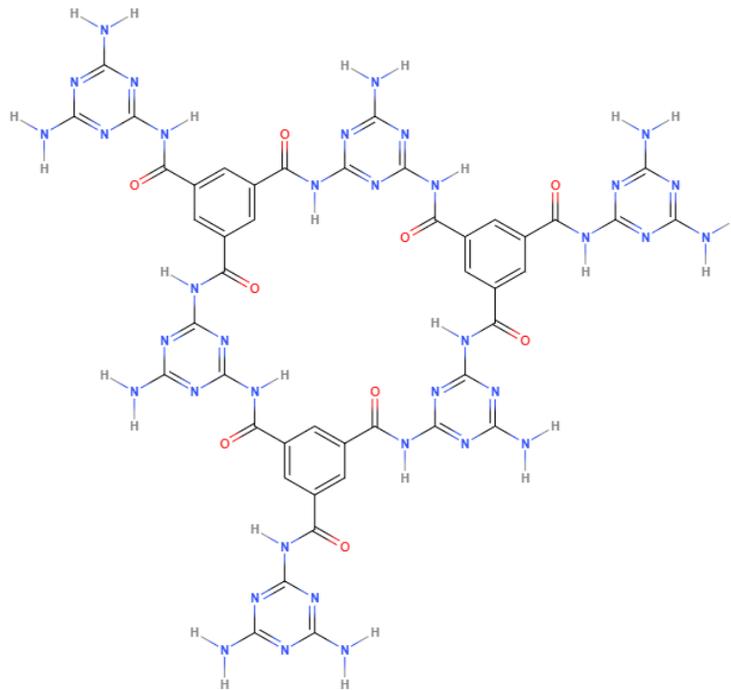


A picture showing a landfill in Sweden. Maol, Koviks Avfallsdeponi, September 26 2006.

Before we can focus on making it so that all of the waste makes it to a recycling center, we need to make sure that we can take care of it when it does. As the situation stands now, upwards of 80% of the plastic packing that gets sent for recycling, does not end up being recycled according to the company Swedish Plastic Recycling. Instead it gets sent to energy recovery plants and gets burnt.

When it comes to a worldwide view, the statistics sadly do not see much improvement. According to Our World in Data, only 19.5% of the total plastic waste from around the world is recycled. This number is way too low for it to be sustainable for the future and it is even lower in some parts of the world. A policy highlight from OECD might be able to shed some light on why countries are not recycling more. It states that the market share of recycled plastics is less than 10%. This means that some countries may not be focusing on recycling their plastic waste because of the fact that there is no monetary reason for it. Instead of investing in big and expensive recycling centers they can instead keep it in a landfill or burn it for energy. The problem with keeping it in a landfill is that a majority of the time that countries choose this option it is done inefficiently. Instead of securely burying it underground, the plastic waste is instead just dumped on land. This means there is a large risk of it being carried by wind or rainfall into rivers. Burning plastics for energy cover is also not an ideal solution as it releases a lot of greenhouse gasses back into the environment.

If we could increase our options in what we can recycle plastics into, we could both increase the amount of plastic that gets recycled and create an increased incentive for corporations to invest in recycling. A study conducted by Michael Strano, professor of chemical engineering at MIT, published on the second of February found that it is possible to create a chemically stable two-dimensional polymer. As opposed to conventional plastics, which are like one-dimensional strings, a two-dimensional polymer, which looks closer to a sheet, would be much stronger while simultaneously retaining the lightness of other plastics. The researchers found that it is around four to six times harder to deform than bulletproof glass and twice as hard to break compared to steel. Because this is a very new discovery nothing has been created yet with the substance which they call 2DPA-1, but they say that the tests suggest that the material could be used in everything from coating cell phones to being a viable building material for bridges or other structures. I reached out to the author of the study Yuwen Zeng to see if he could answer some questions regarding the possibilities of recycling plastics into a two-dimensional polymer but I have yet to receive a response. As this discovery is still very new, the probability of it being a viable option is still not confirmed. If this turns out to be a possible route for recycling plastics it could increase the market worth of recycled plastics and increase the market interest in more areas such as construction.



A recreation of the molecule 2DPA-1. Created using Molview.

To conclude I will repeat that the world still struggles when it comes to recycling plastics. Here in Sweden and internationally the total plastic waste that gets recycled is close to 20%. The market share of plastics worldwide is only around 10%. Recycling plastic waste into a two-dimensional polymer could both lead to an increase in the total plastics that get recycled and an increase in the total market share because of an increased value of the end product and more areas where the end product is a viable option.

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