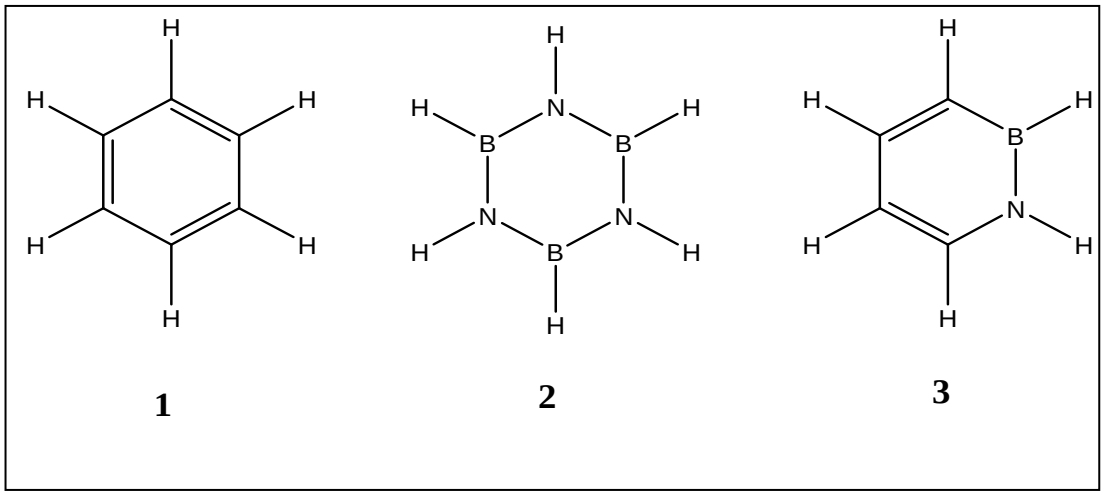
IN FOCUS

Organometalloidal Benzene

Benzene 1 (c-C6H6) was discovered in 1825 by Faraday and synthesized by Berthelot in 1870. On the other hand, inorganic benzene 2 (Borazine, c-B3N3H6) was reported in 1926. Despite the advancement in techniques and tools to devise and direct chemical synthesis, it was a great challenge to synthesize a benzene analog of parent 1, 2-dihydro-1, 2-azaborine 3 (c-C4NBH6), an organic/inorganic1 (hybrid or organometalloidal) benzene.

In 1967 Dewar wrote in one of his paper1, 2 that it –"seems to be very reactive and chemically unstable system prone to polymerization and other reactions".



Since then many groups had been involved in it's synthesis. Recently it was synthesized by Dixon et al. and Liu et al1. The compound 3 is isostructural as well as isoelectronic to benzene and borazine. The melting point of 3 (-45oC) is in between that of benzene (5oC) and borazine (-58oC). Moreover, the N-H and B-H protons of 3 are more protic than corresponding protons of borazine 2 as the protons of 3 show downfield shift with respect to protons of 2. But B-H proton is hydridic in nature than N-H proton in both the compounds. Compound 3 is less aromatic than benzene but more aromatic as compared to borazine. While the resonance stabilization energy for benzene is 34.1* kcalmol-1, for 3 it is 21.1* kcalmol-1. Therefore compound 3 can be considered as aromatic and stable molecule. In addition, it can undergo electrophilic substitution reactions like benzene.

*Calculated Values

References:

1. Adam J. V. Marwitz, Myrna H. Matus, Lev N. Zakharov, David A. Dixon,* and Shih-Yuan Liu*, Angewnte Chemie, DOI : 10.1002/anie.200805554
2. K. M. Davies, M. J. S. Dewar, P. Rona, J. Am. Chem. Soc. 1967, 89, 6294 – 6297.

The Stem Cell Debate

Former U.S. President George Bush's ban on federal funding for stem cell research - President Obama's lifting of the ban, ethical issues regarding stem cell research - why are doctors and scientists so excited about human embryonic stem cells? These are the most frequently talked about issues after Barack Obama allowed federal taxpayer dollars to fund significantly broader research on embryonic stem cells and promised his administration would make up for the ground lost under his predecessor.

Stem cells are cells found in most multi-cellular organisms. They are characterized by the ability to renew themselves through mitotic cell division and differentiating into a diverse range of specialized cell types.. Serving as a sort of repair system for the body, they can theoretically divide without limit to replenish other cells as long as the person or animal is still alive..

Stem cells have potential in many different areas of health and medical research. To start with, studying stem cells will help us to understand how they transform into the dazzling array of specialized cells that make us what we are. A better understanding of normal cell development will allow us to understand and perhaps correct the errors that cause medical conditions like cancers, tumours etc. Another potential application of stem cells is making cells and tissues for medical therapies.

However human embryonic stem cell research is controversial because, with the present state of technology, starting a stem cell line requires the destruction of a human embryo and/or therapeutic cloning. It is not the entire field of stem cell research, but the specific field of human embryonic stem cell research that is at the centre of an ethical debate.

Opponents of the research argue that embryonic stem cell technologies are a slippery slope to reproductive cloning and can fundamentally devalue human life. Those in the pro-life movement argue that a human embryo is a human life that is entitled to protection.

Contrarily, supporters of embryonic stem cell research argue that such research should be pursued because the resultant treatments could have significant medical potential. It is also noted that excess embryos created for in vitro fertilization could be donated with consent and used for the research.

As science and technology continue to advance, so do ethical viewpoints surrounding these developments. It is important to educate and explore the issues, scientifically and ethically.

