

ylides

Also contains definition of: nitrogen ylides

Compounds in which an anionic site Y^- (originally on carbon, but now including other atoms) is attached directly to a heteroatom X^+ (usually nitrogen, phosphorus or sulfur) carrying a formal positive charge. They are thus 1,2-dipolar species of the type $R_mX^+Y^-R_n$. If X is a saturated atom of an element from the first row of the periodic system, the ylide is commonly represented by a charge-separated form; if X is a second, third, etc. row element uncharged canonical forms are available $R_mX=YR_n$. If X is an unsaturated atom, doubly bonded to another first row element Z, the negative charge on Y may be stabilized by π -conjugation, $Z=X^+Y^-R_n \leftrightarrow Z^-X^+=YR_n$. Such ylides belong to the class 1,3 dipolar compounds. However, 1,3-dipolar compounds with only sextet-containing canonical forms (e.g. vinylcarbenes) are not ylides. E.g. $Ph_3P^+C^-H_2 \leftrightarrow Ph_3P^+=CH_2$ (often called a Wittig reagent), $(CH_3)_3N^+C^-H_2$, $RC\equiv N^+N^-R$, $(CH_3)_2S=CHPh \leftrightarrow (CH_3)_2S^+C^-HPh$. Note that ylide is a complete word, not to be confused with the suffix -ylide, used for some radical anions. Subclasses of ylides: Ylides $R_mX^+C^-R_2$ having the negative charge on carbon are classified by citing the name of the element X before the word ylide. E.g. nitrogen ylide, phosphorus ylide, oxygen ylide, *sulfur ylide*. A further specification may be achieved by citing the class name of R_mX before the word ylide. Thus nitrogen ylides include amine ylides, $R_3N^+C^-R_2$, azomethine ylides $R_2C=N^+R-C^-R_2$, nitrile ylides, $RC\equiv N^+C^-R_2$. Some authors, who wish to express the positive charge on X, prefer e.g. ammonium ylides over amine ylides; such usage varies according to the heteroatom X and to national custom. The ylides $R_mX^+Y^- \leftrightarrow R_mX=Y$ ($Y = O, S, Se, Te, NR$) are usually named by citing the name of R_mX followed by the additive nomenclature term for Y (oxide, sulfide, selenide, telluride, imide, respectively). E.g. amine imides; use of the less systematic synonyms amine imines and aminimines is discouraged. Some classes of ylides are known by trivial names e.g. nitrones, Wittig reagents (synonymous with phosphonium ylides).

See also: betaines, dipolar compounds

Source:

PAC, 1995, 67, 1307 (*Glossary of class names of organic compounds and reactivity intermediates based on structure (IUPAC Recommendations 1995)*) on page 1375

PAC, 1994, 66, 1077 (*Glossary of terms used in physical organic chemistry (IUPAC Recommendations 1994)*) on page 1176