

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*.

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