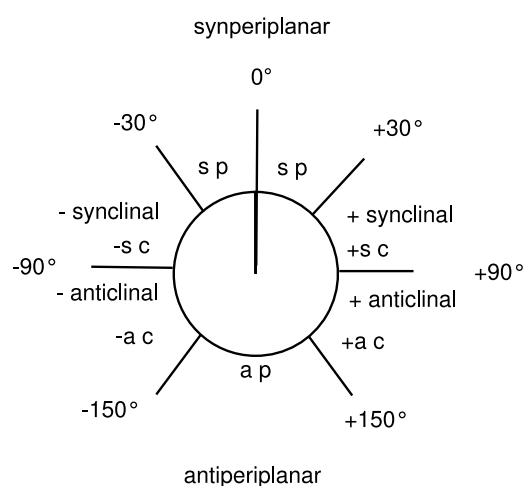


## torsion angle

**Also contains definitions of:** anticlinal, antiperiplanar, clinal, periplanar, synclinal, synperiplanar

In a chain of atoms A-B-C-D, the dihedral angle between the plane containing the atoms A,B,C and that containing B,C,D. In a Newman projection the torsion angle is the angle (having an absolute value between  $0^\circ$  and  $180^\circ$ ) between bonds to two specified (fiducial) groups, one from the atom nearer (proximal) to the observer and the other from the further (distal) atom. The torsion angle between groups A and D is then considered to be positive if the bond A-B is rotated in a clockwise direction through less than  $180^\circ$  in order that it may eclipse the bond C-D: a negative torsion angle requires rotation in the opposite sense. Stereochemical arrangements corresponding to torsion angles between  $0^\circ$  and  $\pm 90^\circ$  are called syn (*s*), those corresponding to torsion angles between  $\pm 90^\circ$  and  $180^\circ$  anti (*a*). Similarly, arrangements corresponding to torsion angles between  $30^\circ$  and  $150^\circ$  or between  $-30^\circ$  and  $-150^\circ$  are called clinal (*c*) and those between  $0^\circ$  and  $30^\circ$  or  $150^\circ$  and  $180^\circ$  are called periplanar (*p*). The two types of terms can be combined so as to define four ranges of torsion angle;  $0^\circ$  to  $30^\circ$  synperiplanar (*sp*);  $30^\circ$  to  $90^\circ$  and  $-30^\circ$  to  $-90^\circ$  synclinal (*sc*);  $90^\circ$  to  $150^\circ$ , and  $-90^\circ$  to  $-150^\circ$  anticlinal (*ac*);  $\pm 150^\circ$  to  $180^\circ$  antiperiplanar (*ap*).



The synperiplanar conformation is also known as the syn- or cis-conformation; antiperiplanar as anti or trans and synclinal as gauche or skew. For macromolecular usage the symbols T, C,  $G^+$ ,  $G^-$ ,  $A^+$  and  $A^-$  are recommended (*ap*, *sp*, *+sc*, *-sc*, *+ac* and *-ac* respectively).

### Source:

PAC, 1996, 68, 2193 (*Basic terminology of stereochemistry (IUPAC Recommendations 1996)*) on page 2220