1. Proper axis of symmetry

It is an imaginary axis around which the rotation carried out on the molecule, which takes the molecule from one orientation to the other equivalent indistinguishable orientation. The proper axis of symmetry is represented by C_n.

The operations generated by this are represented by C_n^m

Where m = no. of times the operation is carried out.

Order of axis:- The order of axis is defined as the number of times an operation is to be carried out so as to get an identical configuration. It is represented by n. where $n = \frac{2\pi}{\theta}$

θ = angle by which rotation is carried out.

	angle	order of axis n.	proper axis of symmetry.
i)	180°	$\frac{360°}{180°} = 2$	C_2
ii)	120°	$\frac{360°}{120°} = 3$	C_3
iii)	90°	$\frac{360°}{90°} = 4$	C_4
iv)	72°	$\frac{360°}{72°} = 5$	C_5
v)	60°	$\frac{360°}{60°} = 6$	C_6
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			and so on

Assignment

Q What is the highest order of axis of symmetry ?

Q. Define the following terms with example.

1) Symmetry element.
2) Symmetry operations
3) Identity
4) Proper axis of symmetry
5) plane of symmetry.
6) Centre of inversion
7) improper axis of symmetry.
8) principal axis of symmetry.

Q. Determine proper axis of symmetry in given molecules.

i) H_2O
ii) NH_3
iii) BF_3
iv) BF_2Cl
v) $BFClBr$
vi) CH_2Cl_2
vii) $PtBr_2Cl_2$
viii) C_2H_4
ix) C_6H_5Cl
x) $PtCl_4$
xi) BH_2Cl
xii) CH_3Cl
xiii) NH_2Cl