

Symmetry operations of C_{2v} group: I , C_2 , σ_v , and σ'_v . $g = 4$.

Special property: C_{2v} is *cyclic* group.

Cyclic group:

Take one symmetry element, S .

All other elements are given by S^k , $k = 1, 2, \dots$

Cyclic groups have only 1D irreps.

C_{2v} is particularly simple:

applying any element twice, we get I .

$$C_2^2 = I, \quad \sigma_v^2 = I, \quad (\sigma'_v)^2 = I.$$

Let ψ be any basis function.

$$S(S\psi) = S^2\psi = \psi$$

Irreps are numbers such that $G^2 = 1 \Rightarrow G = \pm 1$.

$$\sum_{\text{irreps}} \dim^2(\text{irrep}) = g$$

$$\sum_{\text{irreps}} 1 = 4 \Rightarrow \# \text{ of irreps} = 4$$