**CHM102**

**Assignment 8**

**April 18, 2017**

1. Complete the multiplication table shown below, for a molecule such as NH3. Explain your answer.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **E** | **C31** | **C32** | **σvA** | **σvB** | **σvC** |
| **E** | E | C31 | C32 | σvA |  | σvC |
| **C31** | C31 | C32 | E | σvC |  | σvB |
| **C32** |  |  |  |  |  |  |
| **σvA** | σvA | σvB | σvC | E |  | C32 |
| **σvB** | σvB | σvC | σvA | C32 |  | C31 |
| **σvC** | σvC | σvA | σvB | C31 |  | E |

1. Complete the character table shown below, for a D2d point group, using the results of the great orthogonality theorem. Explain your answer.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  D2d | **E** | **2S4** | **C2** | **2C2’** | **2σd** |  |
| **Γ1** |  |  |  |  |  |  |
| **Γ2** |  |  |  |  |  -1 |  |
| **Γ3****Γ4** |  |  |  |  |  -1 |  |
| **Γ4** |  |  |  |  |  1 |  |
| **Γ5** |  |  |  |  |  0 |  |

1. All the characters in the table shown below, were completely faded out. Reconstruct the character table for C4v, using the results of the great orthogonality theorem. Explain your answer.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  C4v | **E** | **2C4** | **C2** | **2σv** | **2σd** |  |
|  | 1 | 1 | 1 | 1 | 1 |  |
|  |  |  |  |  |   |  |
|  |  |  |  |  |   |  |
|  |  |  |  |  |   |  |
|  |  |  |  |  |   |  |

1. Construct a matrix that can serve as a representation for a rotation of 180o around the z-axis. Use (x,y,z) as the basis of representation.