Exercise: Derivation of the space groups of a crystal class from the principles underlying the Hermann-Mauguin Symbols.

Problem. Determine the space-group types which belong to the crystal class $4/m \sim C_{4h}$ of order 8.

1. Select a set of two elements of $4/m$ which generate the group.
2. Write down the matrices of the generators of $4/m$ referred to a conventional basis.
3. Write down the matrices of the elements of $4/m$ referred to a conventional basis.
4. Write down the general (4×4)-matrices of the corresponding generators of the space groups, referred to a conventional basis and to a convenient origin.
5. Determine the compatibility conditions of the column coefficients.
6. Which are the space-group types for the tetragonal P lattice ?
7. Which are the space-group types for the tetragonal I lattice ?