

Exercises 25.02.2025 b - Symmetry

1 In a material of the CsCl-structure (Fig.1.1), a phase transition occurs, which leads to a vertical displacement of the central atom of the unit cell along a 4-fold axis (Fig.1.2). Find the symmetry of the resulting phase.

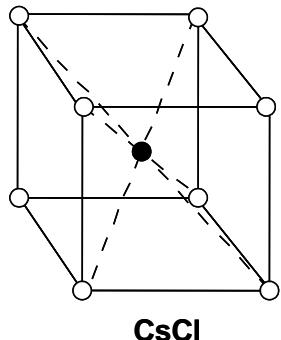


Fig.1.1

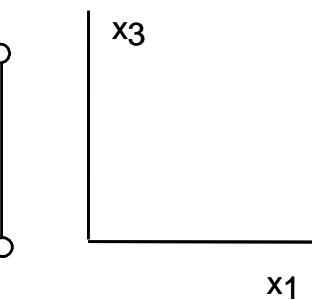
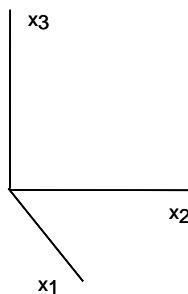
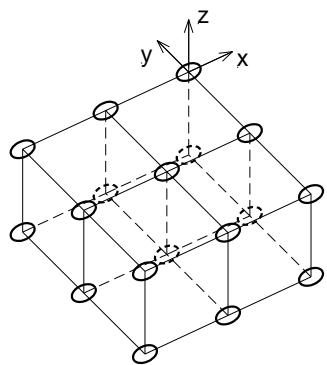


Fig.1.2

2. Find the point group symmetry of the following structure. The ovals are flat and lie in the (XY)-plane. The fundamental translation vectors are $(a,0,0)$, $(0,a,0)$, and $(0,0,a)$.



3 Propose a phase transition which reduces the symmetry of CsCl structure (Fig.1.1) from cubic ($m\bar{3}m$) to mmm

4 Modify the object shown in slide Lect.2-58 by adding/removing atoms to obtain an object with symmetry: (a) 4
(b) $\bar{4}$.

5 Modify the object shown in slide Lect.2-58 by stretching it and/or adding/removing atoms to obtain an object with symmetry: (a) mmm
(b) 222