UNIVERSITÄT SIEGEN
FESTKÖRPERPHYSIK

Crystallography

8. Homework Unit cell, 32 Point Groups

1. The 2D crystal structure has a 3-fold axis. Define type of Bravais lattice for this crystal. The atomic positions in a unit cell by can be described by the vectors **A**=[x,y]:

a) [x,y]=[0.2,0.1]
b) [x,y]=[1/3,2/3]
c) [x,y]=[1/3,1/7]
d) [x,y]=[0.3,0.7]

Find all symmetry equivalent positions of atoms in the crystallographic unit cell.

2. The structure of a 2D crystal can be describes by a centered rectangular crystal system. This structure has a mirror plane m, which is parallel to the crystallographic b-axis ([-x,y] transformation). The atomic positions are given by the following vectors A=[x,y]:
a) [x,y]=[0.2,0.1];
b) [x,y]=[0,0];
c) [x,y]=[0.25,0.25];
d) [x,y]=[0.3,0.7];

Find the positions of all symmetry-equivalent atoms in the crystallographic unit cell (the unit cell is not primitive).

3. Draw the symmetry diagrams for the trigonal crystal system

a. Point Group 32
b. Point Group 3m

Draw the symmetry diagrams for the tetragonal crystal system

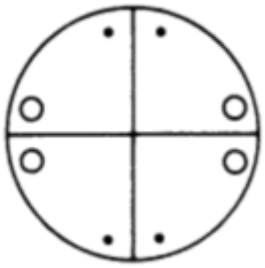
c. Point Group 422
d. Point Group 4/m

Draw the symmetry diagrams for the hexagonal crystal system

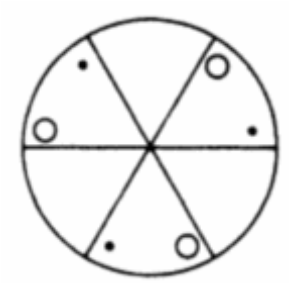
e. Point Group 6mm
f. Point Group 6/m
g. Point Group 622

4. Define corresponding point groups for the depicted below symmetry diagrams:

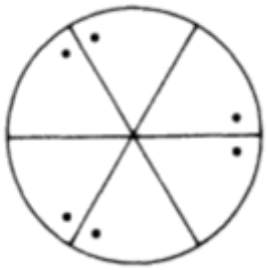
a.



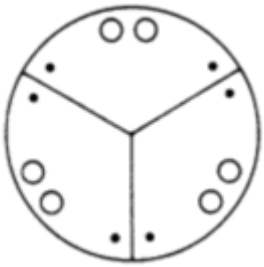
b.



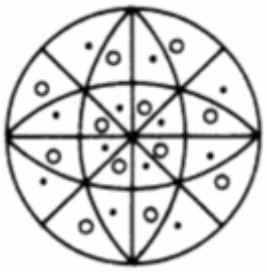
c.



d.



e.



f.