Kasdi Merbah University - Ouargla -

Faculty of Mathematics and Material Science

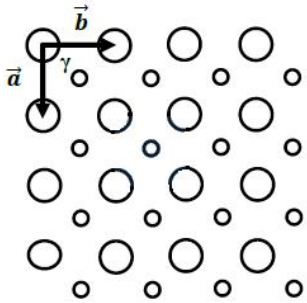
physics department

Second year physics

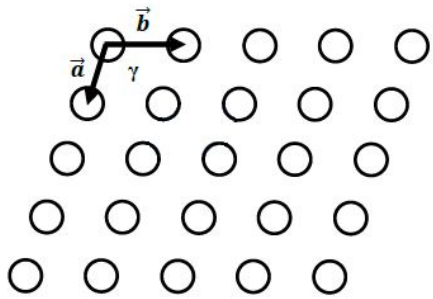
A series of exercises and problems N01-2024/2025

Crystallography

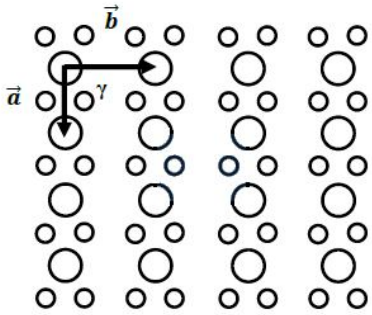
Exercise 1: Identify the conventional cell and the primitive cell in the following.



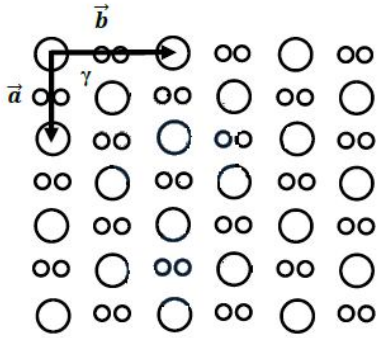
1) Carré : a = b, γ = 90°



2) Oblique : a ≠ b, γ quelconque



3) Rectangulaire : a ≠ b, γ = 90°



4) Rectangulaire centré : a ≠ b, γ = 90°

Exercise 2:

According to the cell dimensions (parameters) of the crystal lattice, arrange the Bravais lattices from highest symmetry to lowest symmetry, stating a minimum one corresponding point group for each.

Exercise 3:

Check mathematically and geometrically the possible rotation axes in the crystal lattice, and prove that the 5-fold axis is invalid rotation in the crystal lattice.

Exercise 4:

-1) Calculate the packing factor of the simple cubic structure, the body-centered cubic structure, and the face-centered cubic structure.

-2) Find the coordination number of all previous structures.

-3) Find the number of the second and third nearest neighbors in the simple cubic structure.

Exercise 5:

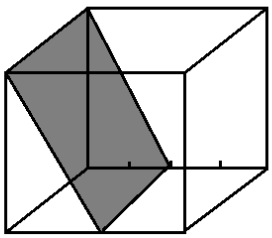
For the cubic lattice system, represent:

-1) Crystallographic directions [110], [201], [132].

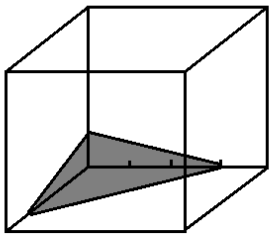
-2) Crystallographic planes (110), (201), (132).

Exercise 6:

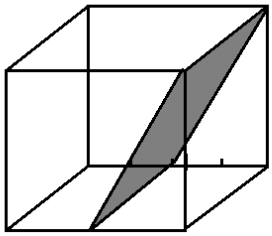
Determine the Miller indices for the following crystal planes



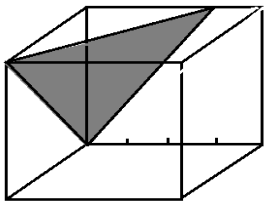
- a -



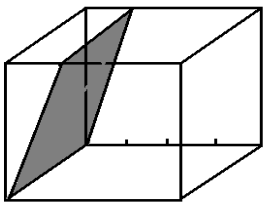
- b -



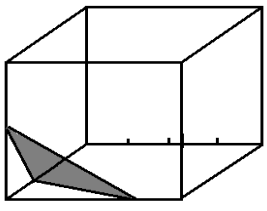
- c -



- d -



- e -



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