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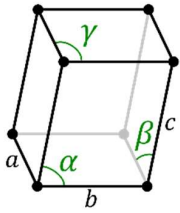
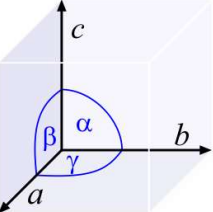
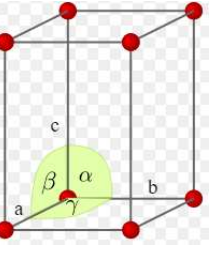
EBS 209
MINEROLOGY
ASSIGNMENT 2

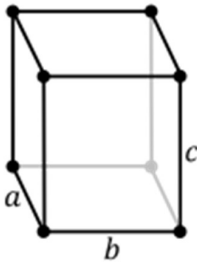
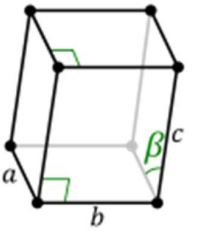
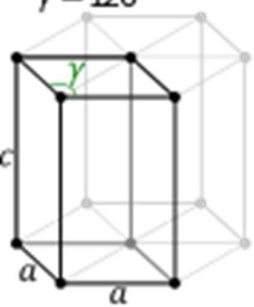
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MATRIC : 138697
YEAR : 4
COURSE : MINERAL RESOURCE ENGINEERING

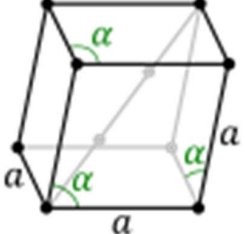
Titles: Crystal system/Unit cell

Question 1: Name a unit crystal system, the axes, angle, Herman Mauguin Notation and the example of the crystal/mineral and chemical formula as in the table below.

Question 2: What criteria is involved in dividing 6 crystal into 32 crystal classes? List the criteria.

Crystal system and crystal class	Draw crystal system axes: a,b,c and α, β, γ angle	Hermann mauguin notation/symbols based on the symmetry	Example of the crystal/mineral and chemical formula
Triclinic: (i) Pedial (ii) Pinacoidal	$a \neq b \neq c$ $\alpha \neq \beta \neq \gamma \neq 90^\circ$ 	(i) Pedial: 1 (ii) Pinacoidal: $\bar{1}$	Amazonite <chem>KAlSi3O8</chem>
Isometric/cubic: (i) Tetartoidal (ii) Diploidal (iii) Gyroidal (iv) Hextetrahedral (v) Hexoctahedral	$a = b = c$ $\alpha = \beta = \gamma = 90^\circ$ 	(i) Tetartoidal: 23 (ii) Diploidal: $2/m \bar{3}$ (iii) Gyroidal: 432 (iv) Hextetrahedral: $\bar{4}3m$ (v) Hexoctahedral: $4/m \bar{3} 2/m$	Fluorite <chem>CaF2</chem>
Tetragonal: (i) Tetragonal pyramidal (ii) Tetragonal disphenoidal (iii) Tetragonal dipyramidal (iv) Tetragonal trapezohedral (v) Ditetragonal trapezohedral	$a = b \neq c$ $\alpha = \beta = \gamma = 90^\circ$ 	(i) Tetragonal pyramidal: 4 (ii) Tetragonal disphenoidal: $\bar{4}$ (iii) Tetragonal dipyramidal: $4/m$ (iv) Tetragonal trapezohedral: 422 (v) Ditetragonal pyramidal: $4mm$ (vi) Tetragonal scalenohedral: $\bar{4} 2m$	Wulfenite <chem>PbMoO4</chem>

(vi) Tetragonal scalenohedral (vii) Ditetragonal dipyramidal		(vii) Ditetragonal dipyramidal: $4/m\ 2/m\ 2/m$	
Orthorhombic: (i) Orthorhombic disphenoidal (ii) Orthorhombic pyramidal (iii) Orthorhombic dipyramidal	$a \neq b \neq c$ $\alpha = \beta = \gamma = 90^\circ$ 	(i) Orthorhombic disphenoidal: 222 (ii) Orthorhombic pyramidal: $mm2$ (iii) Orthorhombic dipyramidal: $2/m\ 2/m\ 2/m$	Tanzanite $\text{Ca}_2\text{Al}_3(\text{SiO}_4)_3(\text{O H})$
Monoclinic: (i) Sphenoidal (ii) Domatic (iii) Prismatic	$a \neq b \neq c$ $\alpha = \gamma = 90^\circ, \beta \neq 90^\circ$ 	(i) Sphenoidal: 2 (ii) Domatic: m (iii) Prismatic: $2/m$	Azurite $\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$
Hexagonal: (i) Hexagonal pyramidal (ii) Trigonal dipyramidal (iii) Hexagonal dipyramidal (iv) Hexagonal trapezohedral (v) Dihexagonal pyramidal (vi) Ditrigonal dipyramidal (vii) Dihexagonal dipyramidal	$a = b \neq c$ $\alpha = \beta = 90^\circ, \gamma \neq 120^\circ$ $\gamma = 120^\circ$ 	(i) Hexagonal pyramidal: 6 (ii) Trigonal dipyramidal: $3/m$ (iii) Hexagonal dipyramidal: $6/m$ (iv) Hexagonal trapezohedral: 622 (v) Dihexagonal pyramidal: $6mm$ (vi) Ditrigonal dipyramidal: $3/m\ m$ (vii) Dihexagonal dipyramidal: $6/m\ 2/m\ 2/m$	Emerald $\text{Be}_3\text{Al}_2\text{SiO}_6$

<p>Trigonal/ Rhombohedral:</p> <p>(i) Trigonal pyramidal (ii) Rhombohedral (iii) Trigonal trapezohedral (iv) Ditrigonal pyramidal (v) Ditrigonal scalenoahedral</p>	<p>$a=b=c$ $\alpha=\beta=\gamma\neq 90^\circ$</p> 	<p>(i) Trigonal pyramidal: 3 (ii) Rhombohedral: $\bar{3}$ (iii) Trigonal trapezohedral: 32 (iv) Ditrigonal pyramidal: 3m (v) Ditrigonal scalenoahedral: $\bar{3} 2/m$</p>	<p>Rhodochrosite $MnCO_3$</p>
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Criteria involved in dividing 6 crystals into 32 crystal classes:

- Point symmetry
- Order
- Number of rotational symmetry fold
- Symmetry operation
- Rotation axes
- Herman-Mauguin symbol