Chap No.6 SOLIDS

Types	Constituent particles	Nature of forces	Melting point	Bond energy (kJ/mol)	conductivity	Examples
Ionine	Cations and anoins	Ionic	Very high	400-4000	Conductor	NaCl,CaO,KNO_3
Covalent	Atoms	Covalent	Extremely high	150-500	Insulators	Diamond , SiO,SiO_2, silicon, crystal
Molecular	Molecules	Vander waal	Lowest	Low	Insulators	I_2, S_8, ice, dry ice
Metallic	Atoms	Metallic bond	High	80-1000	Conductors	Cu, Au, Ag alloys

Solid and its types

Types of solids

1. Crystalline / true solids
2. Amorphous solids/ super cooled liquids

Crystalline solids are also called True solids

1. Amorphous solids are also called Super cooled liquids
2. Crystalline solids have definite Geometrical shape and their particles are Arranged properly
3. Amorphous solids have no definite shape and its particles are packed together without Proper arrangement
4. NaCl, CaCO3 , CaO, CuSO4 .5H2 O , Graphite and Diamond etc are Crystalline solids
5. Glasses, Plastics, Rubber,Coal, Tar and Gemstone are Amorphous solids

Amorphous solids are made by silicates fusing with

6. Borax oxide
7. Aluminium oxide
8. Phosphorous pentaoxide
9.

Properoties of crystalline solids

1. Symmetry
   - Plane of symmetry >1
   - Axis of symmetry >1
   - Centre of symmetry = 1
2. Geometric shape
3. Melting point
4. Cleavage plane
5. Habit of crystal
6. Crystal growth
7. Anisotropy

Symmetry

10. Plane of symmetry can be More than 1
11. Axis of symmetry can be More than 1

12. Centre of symmetry can be Only 1

Geometrical shape

13. Grinding to a very fine powder, crystalline solids still retain their specific Geometrical shape

Melting point

14. The temperature of crystalline solids remain constant until all particles Become mobile

Cleavage plane

15. The magnitude of interfacial angles after cleavage has taken place is always Different for different solids

Habit of crystal

16. NaCl has a Cubic Habit

Crystal Growth

17. NaCl will grow in one dimension (needle like) if % of urea present is 10%
18. Crystalline solids have anisotropic behavior because of Regular particles arrangement

POINT

Remember the examples fo isomorphs and their corresponding structure.

Isomorphism

NaCl - MgO	Cubic structure
ZnO - CdS	Hexagonal
KNO_3 - $NaNO_3$ - $CaCO_3$	Rhombohedral

19. Physical properties of isomorphs are Different from each other
20. Existence of more than two compounds in one crystalline form Isomorphism

Polymorphism

21. Existence of one compound in more than one crystalline form Polymorphism

KNO_3 - $AgNO_3$	Rhombohedral + orthorhombic
$CaCO_3$	Trignol + orthorhombic

POINT

Remember the examples of polymorphs and their structures.

Allotrophy

22. Existence of one element in more than one crystalline form Allotrophy
23. Sulphur exist in two allotropic forms Rhombohedral and monoclinic

Suphur	Rhombohedral and monoclinic
Oxygen	O2 and O3
Carbon	Diamond, graphite and bucky balls
Tin	Grey tine cubic and white tin tetragonal

POINT

Remember the examples fo allotrphy and their allotrphic forms .

Transition Temperature

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Properoties of crystalline solids

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   - Axis of symmetry >1
   - Centre of symmetry = 1
2. Geometric shape
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5. Habit of crystal
6. Crystal growth
7. Anisotropy

Symmetry

10. Plane of symmetry can be More than 1
11. Axis of symmetry can be More than 1

Types of crystalline solids

Ionic crystal	Long range, Never exist in liquid or gas, Soluble in polar, NaCl, MgO ,NaBr
Metallic crystal	Malleable → sheets, Ductile → wires, Only few are soft, Copper, iron, aluminium, sodium, silver
Covalent crystal	isoluble in polar Diamond, carborundum, silicon carbide
Molecular crystal	Tightly packed patters Soft May be:Polar (sugar and ice) or Non-polar (solidified noble gas, CO_2, S, P and I)

46. NaCl, MgO and NaBr are Ionic crystals
47. Diamond, Carborundum and Silicon carbide are Covalent crystals
48. Copper, Alluminium, Silver, Iron and Sodium are Metallic crystals
49. Ice and Sugar are Polar molecular crystals
50. Carbondioxide, Sulphur, Phosporus, Solidified noble gases and Iodine are Non-polar molecular crystals
51. The melting point of Ionic crystals, Covalent crystals, Metallic crystals are high while Molecular crystals have High meting point
52. The Ionic crystals, Covalent crystals, Metallic crystals are hard while Molecular crystals are Soft
53. The Ionic crystals are soluble in Polar
54. The Covalent crystals are soluble in Non-polar
55. The Molecular crystals are soluble in Non-polar
56. Ionic crystals are Do not conduct heat and electricity
57. Covalent crystals are Poor conductors of heat and electricity
58. Metallic crystals are Good conductors of heat and electricity
59. Metallic crystals Ductile and Malleable
60. Because of the polar nature of molecule and presence of strong hydrogen bonding, ice has high value of Heat of fusion
61. Molecular crystals are soft and have low melting points.
62. Ionic, covalent and metallic crystals are hard and have high m.ps