

② classifications of solids by atomic arrangement

	<i>ordered</i>	<i>disordered</i>
atomic arrangement	regular	random*
order	long-range	short-range*
name	crystalline “crystal”	amorphous “glass”

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Early Crystallography

Robert Hooke (1660): cannon balls

- crystal must owe its regular shape to the packing of spherical particles (balls)

Niels Steensen (1669): quartz crystals

- all crystals have the same angles between corresponding faces

Christian Huygens (1690): calcite crystals

- drawings of atomic packing & bulk shape

René-Just Haüy (1781): cleavage of calcite

- common shape to all shards: rhombohedral
- mathematically proved that there are only 7 distinct space-filling volume elements

👉👉👉 **7 crystal systems**

~ 7 distinct shapes of “milk cartons”

August Bravais (1848): more math

- mathematically proved that there are 14 distinct ways to arrange points in space

👉👉👉 **14 Bravais lattices**