

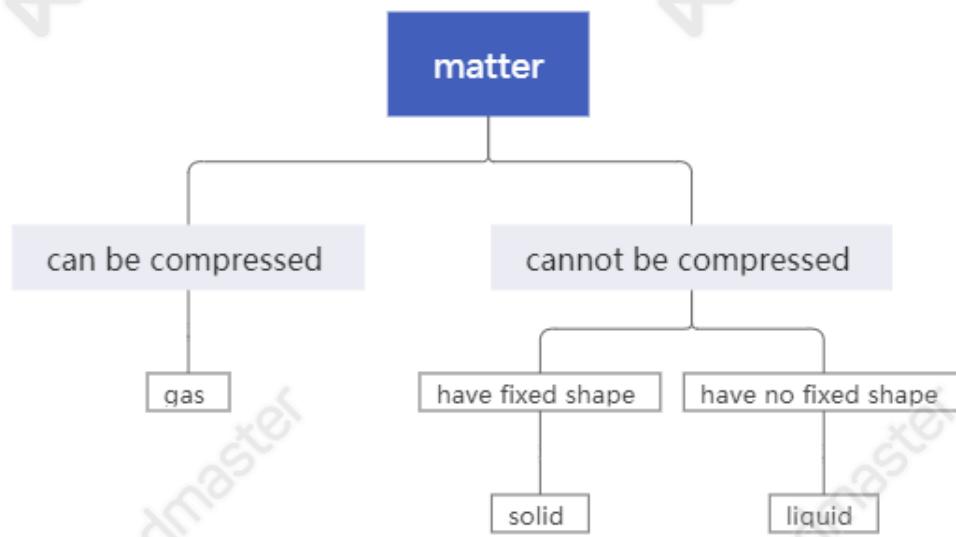
Ch. 6

- Ch. 6.1 (particle theory)
 - matter
 - two properties (特性)
 - mass
 - take up space
 - no matter
 - light
 - basic idea
 - Democritus
 - matter was divided into smaller and smaller pieces
 - at some points, get very tiny pieces -- couldn't be further divided
 - called particles
 - particles -- building blocks of matter
 - Robert Brown
 - pollen grains move randomly on their own in still water
 - called Brownian motion
 - Albert Einstein
 - water -- made up of very small water particles
 - water particles -- much smaller than pollen grains
 - move in different directions
 - hit pollen grains in different directions from time to time
 - pollen grains -- move randomly in zigzag paths
 - particle theory
 - all matter -- made up of particles
 - particles -- very small
 - different matter -- made up of different particles
 - different particles
 - different sizes
 - different masses
 - particles -- move all the time
 - empty spaces between particles

- different types of particles
 - atoms(原子)
 - basic types of particles making up matter
 - some substances → made up of only 1 kind of atom
 - gold → gold atoms
 - iron → iron atoms
 - molecule (分子)
 - some substances → made up of molecules
 - consists of two/ more atoms joined together
 - some molecules consist of same kind of atom
 - 1 water molecule → 2 hydrogen atoms & 1 oxygen atom
 - 1 oxygen molecule → 2 oxygen atoms
 - carbon dioxide molecule → 2 oxygen atoms & 1 carbon atom
 - particles of different substances
 - different sizes
 - different masses
 - chemical formula of a molecule
 - each molecule → own chemical formula (化學式)
 - show → types & number of atoms
 - example
 - O₂
 - O → 1 oxygen atom
 - 2 → 2 oxygen atoms in 1 oxygen molecule
- 6.2 particle model
 - properties of matter in 3 states
 - solid
 - ✓fixed shape
 - ✓fixed volume
 - liquid
 - ✗fixed shape

- ✓fixed volume
- gas
 - ✗fixed shape
 - ✗fixed volume
-

 mindmaster



- particle model
 - models in science
 - designing aeroplane → make model & test model in wind tunnel
 - help scientists study how aeroplane work
 - use models → study & explained how things work
 - illustrate structures of objects & real systems as well as concepts
 - use kinetic motion model → explain Brownian motion of fat droplets in water
 - arrangement & movement of particles in three states of matter
 - proposed particle model based on particle theory
 - help describe arrangement & movement of particles in solids, liquids & gases
 - solid
 - particles
 - close together & arrangement regularly

- **X move** from one position to another
 - only **vibrate** about **fixed positions**
- particles in solids → like audience sitting in cinema
 - audience → close & in regular arrangement
- liquid
 - particles
 - **close** together
 - arrangement **irregularly**
 - move around each other
 - particles in liquid → like people in crowd
 - people → close
 - move through crowd
- gas
 - particles
 - **far apart**
 - move **freely** in all directions
 - particles in gases → like people running in all directions with lots of space between them
- scientists use particle model → describe arrangements & movement of particles in three states of matter.