Air Pollution Control Technology

Air Pollution control : Particulate Matter

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Chapter Description

- Aims
  - To explain current practice on particulate matter emission control
- Expected Outcomes
  - Students could briefly discuss the source and movement of particles
  - Student are able to determine the efficiency of pollution control technology
- References
  - de Nevers, N. (2000). Air Pollution Control Engineering. 2nd Edition. McGraw-Hill. USA.

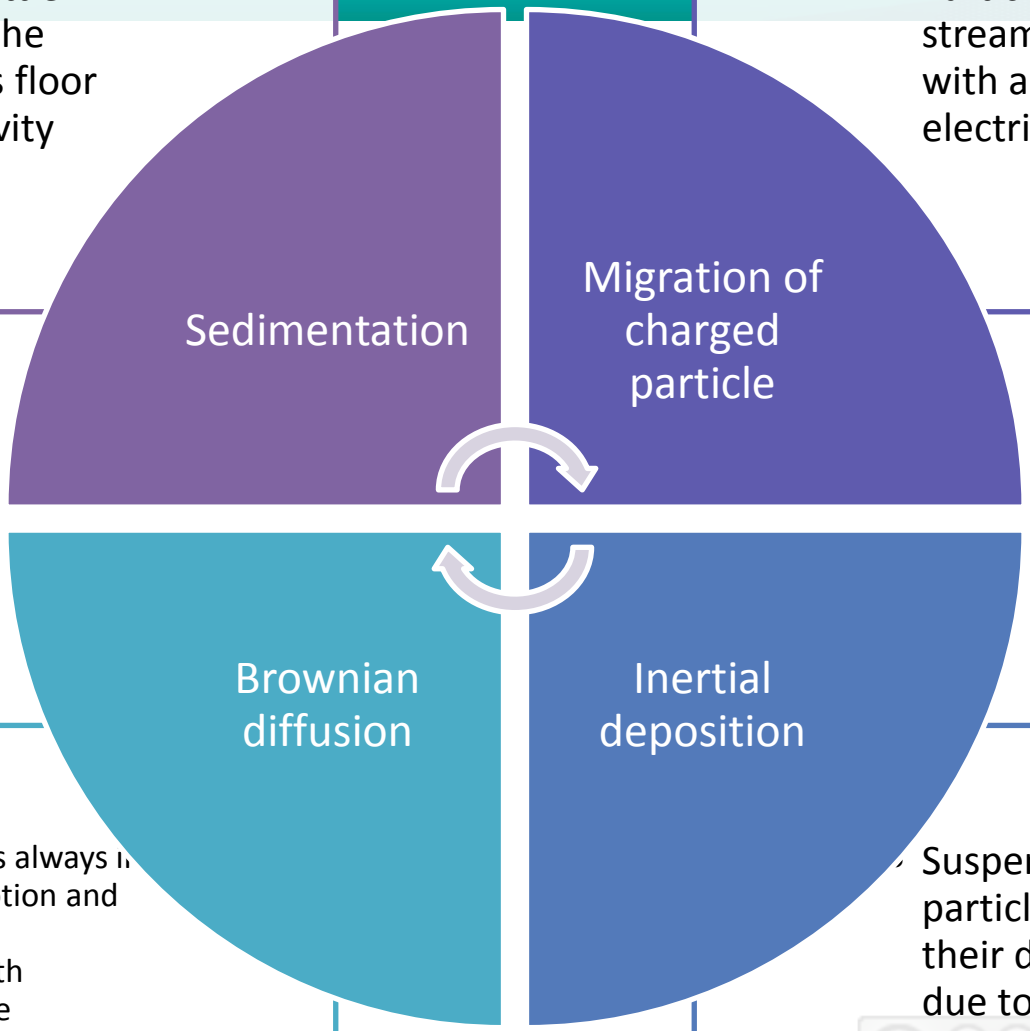
Particle Movement

- Buoyancy force
- Drag force
- Gravity force
- Terminal Velocity Calculation: particles will travel at a constant velocity (small particles)

Mechanism

- Particle settle down on the chamber's floor under gravity

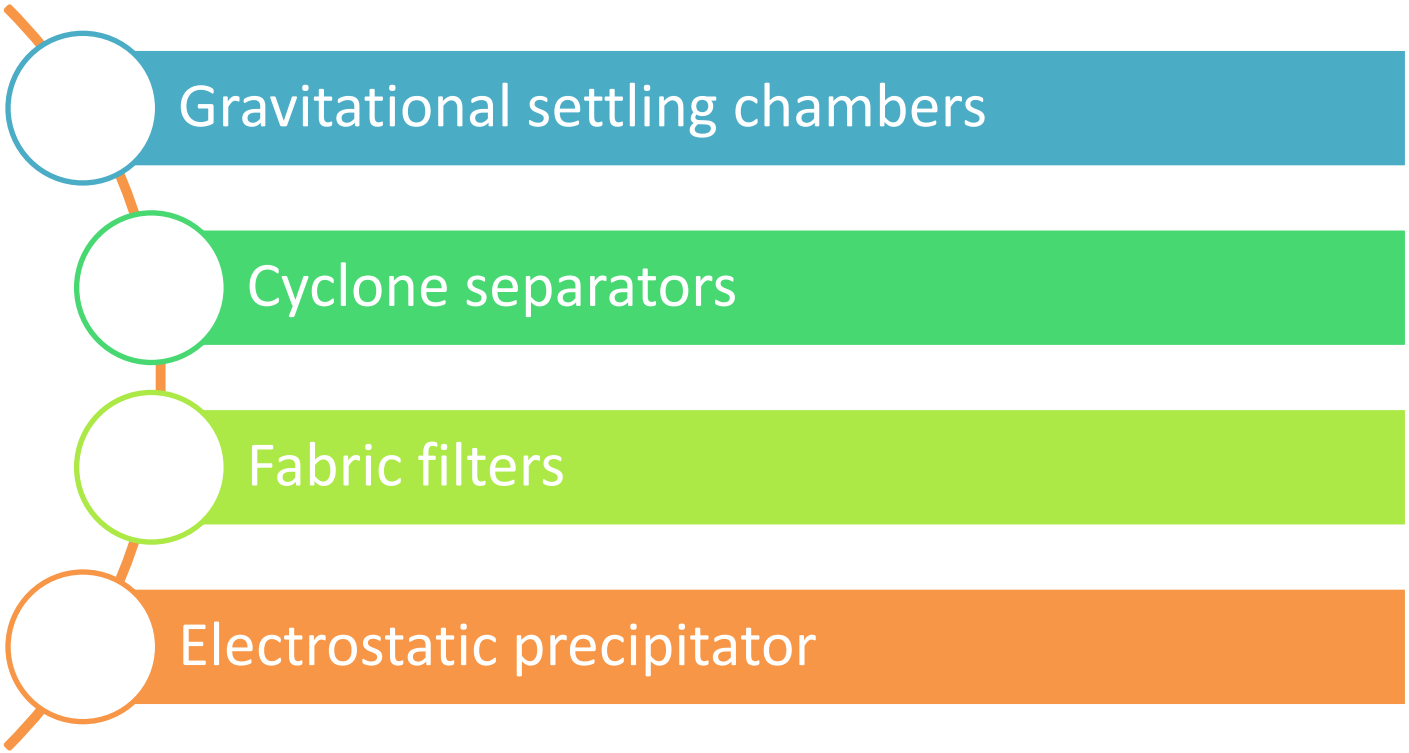
- Particle in gas stream charged with a device with electric



- Particle in gas always i
  Brownian motion and adhere when contacted with obstacle to be collected

- Suspended particle moving in their direction due to inertia

Particle emission control by separation



Gravitational Chamber

To remove large and abrasive particles (>50 µm) from gas stream

As a pre treatment

Common velocity between 0.5 to 2.5 m/s

Cyclone separator

Remove particles by spinning gas contain solid where the gas spirals upward and particles settled down

Centrifugal force depend on particle mass, gas velocity within the cyclone and cyclone diameter

Advantage: Inexpensive, simple to design and maintain, less floor area, low pressure loss

Disadvantage : lower efficiency for smaller particles, sensitive

Fabric filters

- Purpose – remove solids from aerosol
- Air is forced through a fabric and the particulate accumulate on the cloth
- Parameter of design – filter area, material and cleaning method

Electrostatic precipitators

- Purpose – gas cleaning for high gas volume
- Application – chemical and metallurgical process industries, electrical power plants, portland cement kilns etc

Conclusion

- Various technologies applied to remove and control particulate emission from the sources however the each equipment has its own advantages and disadvantages. The removal efficiency of control depend on different factor and condition

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