



# Bentonite

2025, Drilling Fluids HDD Applications

Cebo Holland B.V.



- Water alone may cause formation instability and drilling problems
- Water alone is not able to perform “drilling fluid functions”
  
- How do we...
  - Create viscosity
  - Carry cuttings
  - Suspend cuttings
  - Stabilize the borehole
  - Protect the formation



# Bentonite!

- It is water-swellable
- It forms a viscous slurry when mixed in water
  - Gives carrying capacity
  - Creates suspension
  - Builds a wall cake
  - Imparts filtration control
- It has excellent sealing ability
- Other clays do not possess all these properties



# Bentonite

- Formed millions of years ago
- First found in;
  - Fort Benton, USA
  - Montmorillion, France
- Mining operations
  - Europe
  - Asia
  - Wyoming (USA)







# Bentonite

## Applications

- HDD
- Vertical
- Oil & gas
- Civil engineering
- Microtunneling
- Iron ore pelletizing
- Soil improvement
- Nuclear waste disposal





# Bentonite

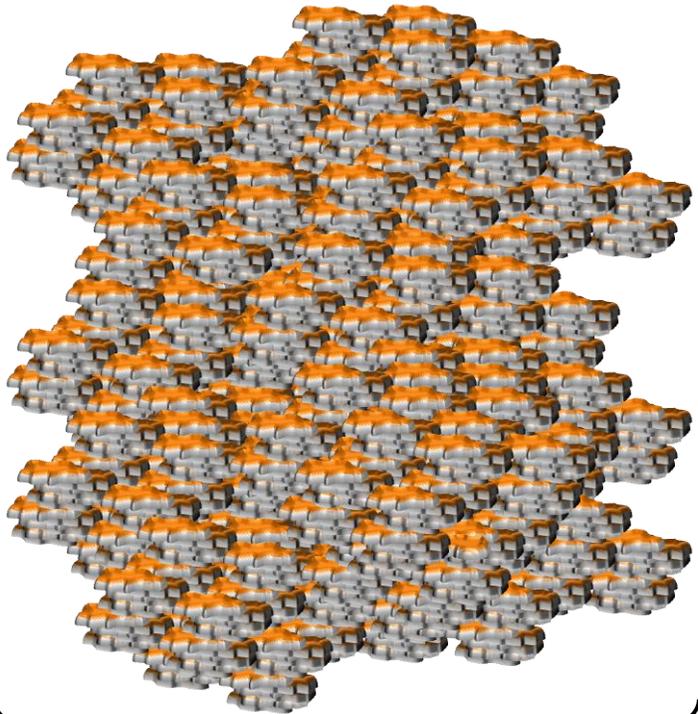
Other applications



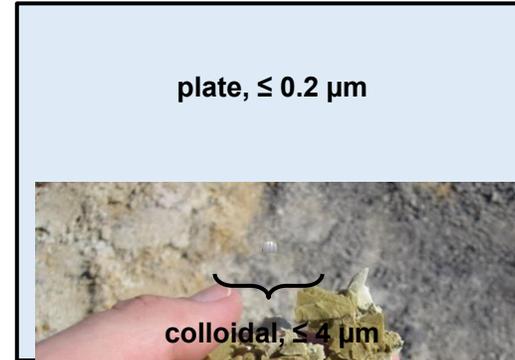


# Bentonite

From ore to platelet



Ore, 6,5 mm to 50 mm



plate,  $\leq 0.2 \mu\text{m}$

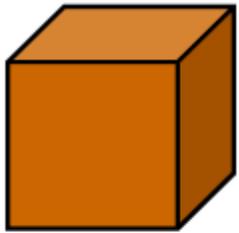
colloidal,  $\leq 4 \mu\text{m}$

milled, 10  $\mu\text{m}$  tot 100  $\mu\text{m}$



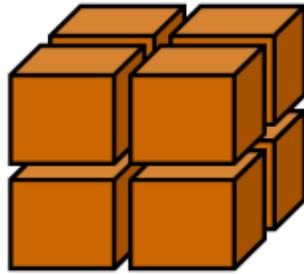
# Bentonite

From ore to platelet



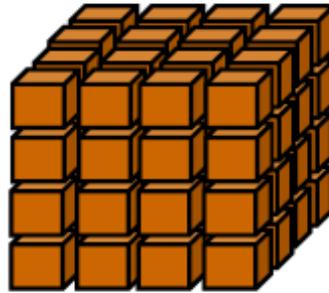
74 microns

32856  
microns<sup>2</sup>



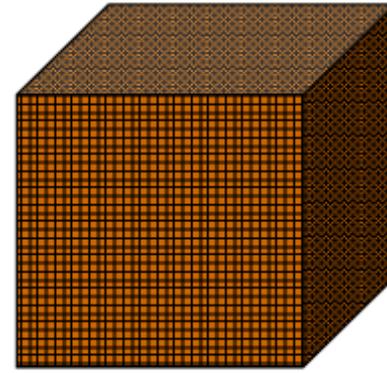
37 microns

65712  
microns<sup>2</sup>



18.5 microns

131424  
microns<sup>2</sup>



4 microns

590,000  
microns<sup>2</sup>



0.15 microns

3,000,000,000  
microns<sup>2</sup>

Shear + Hydration Time

Powder in  
the Bag



Drilling Fluid

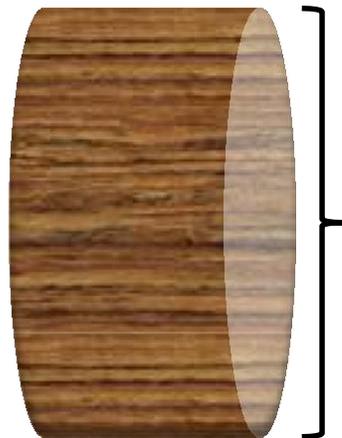


# Bentonite

From ore to platelet



Human Hair



70  $\mu\text{m}$

Red Blood Cell

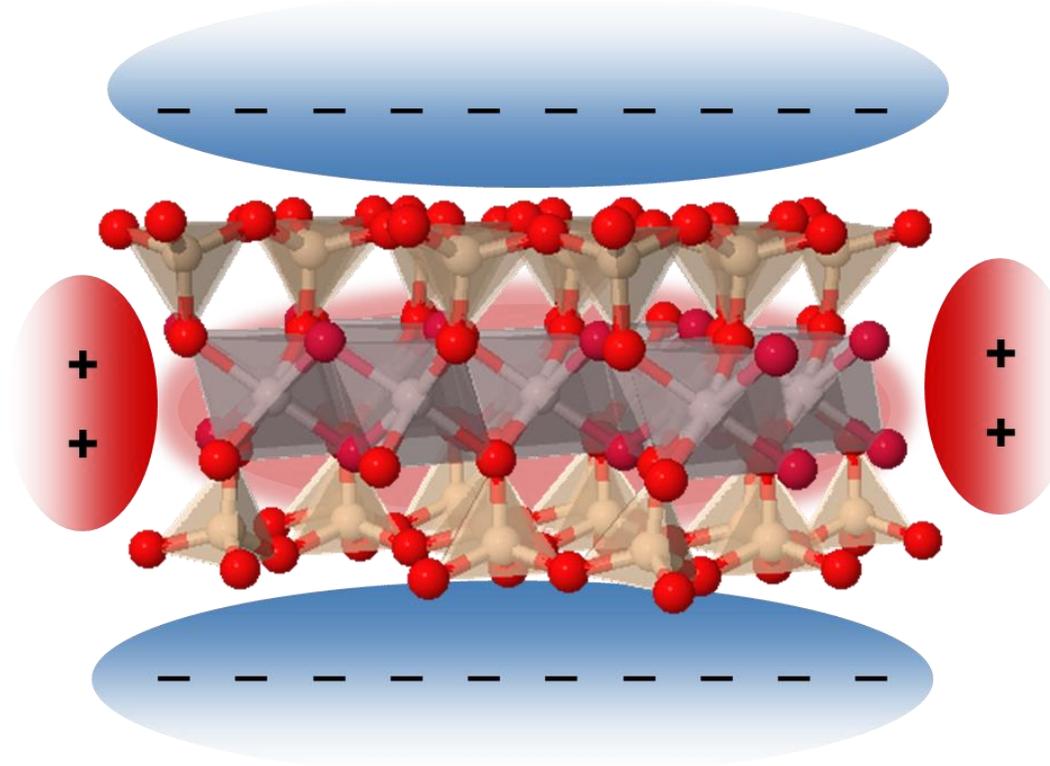


6 – 8  $\mu\text{m}$



# Bentonite

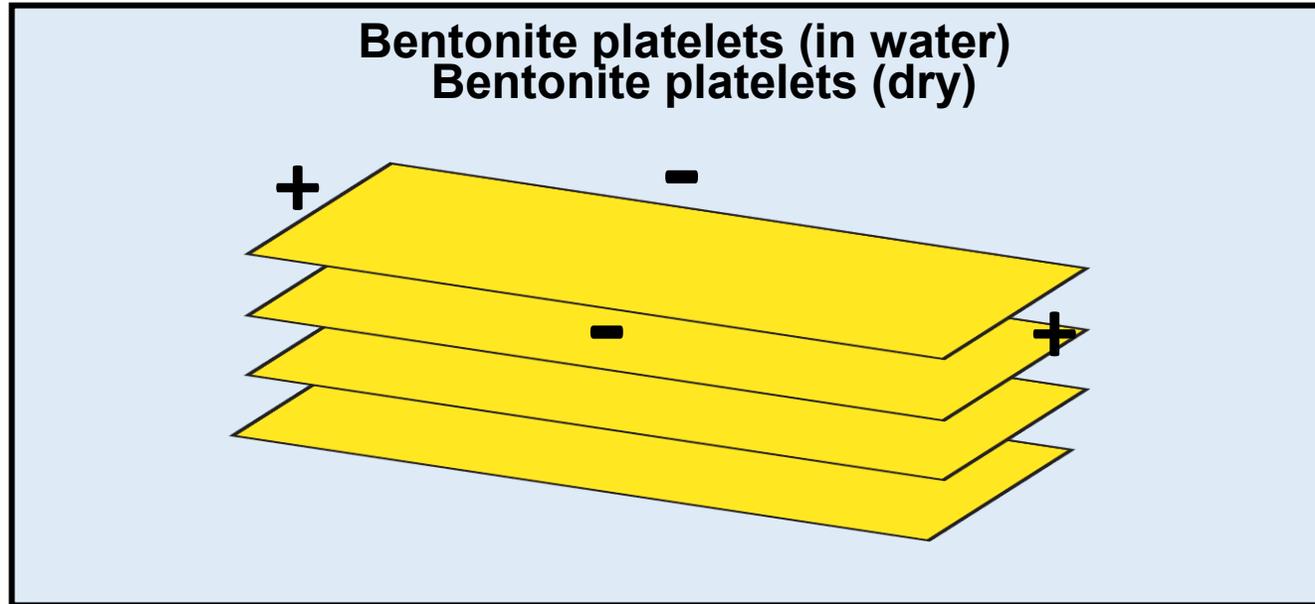
From ore to platelet





# Bentonite

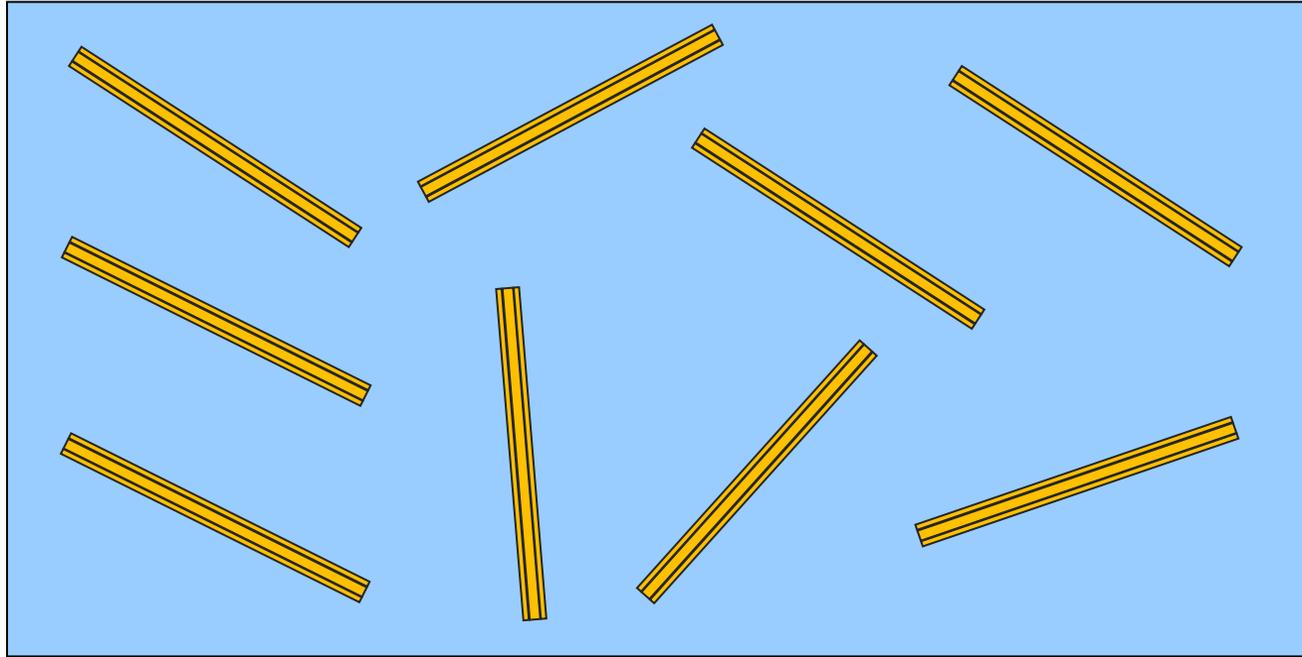
Viscosity





# Bentonite

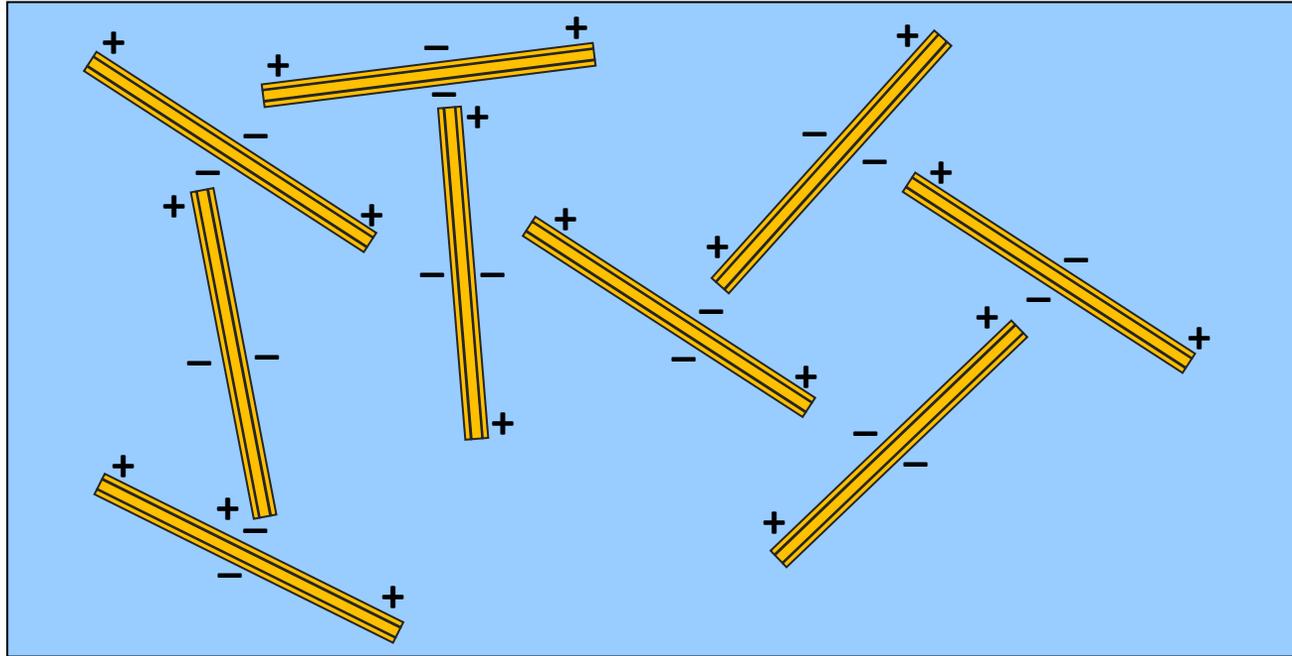
Gel strength





# Bentonite

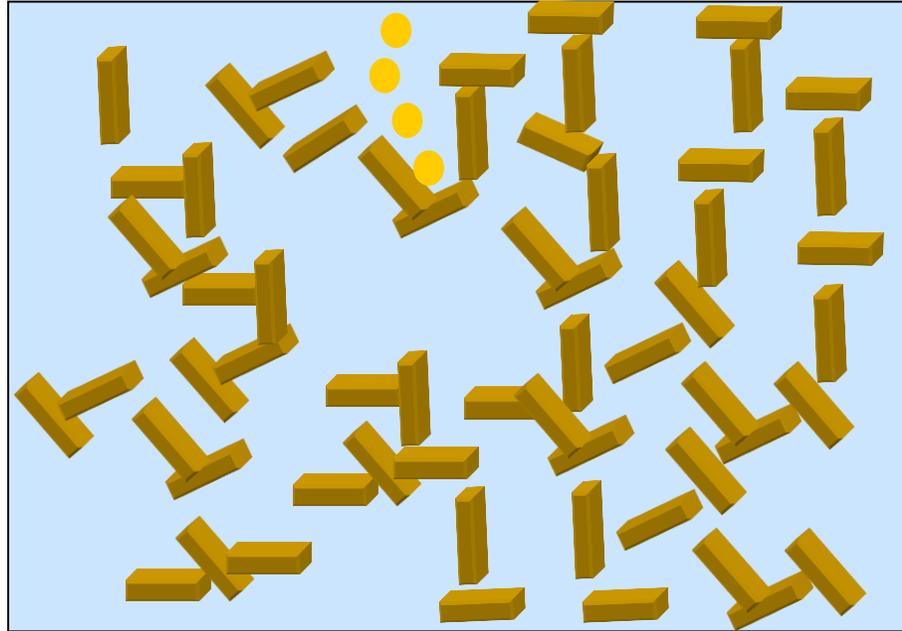
Gel strength





# Bentonite

Gel strength (suspension)







# Bentonite

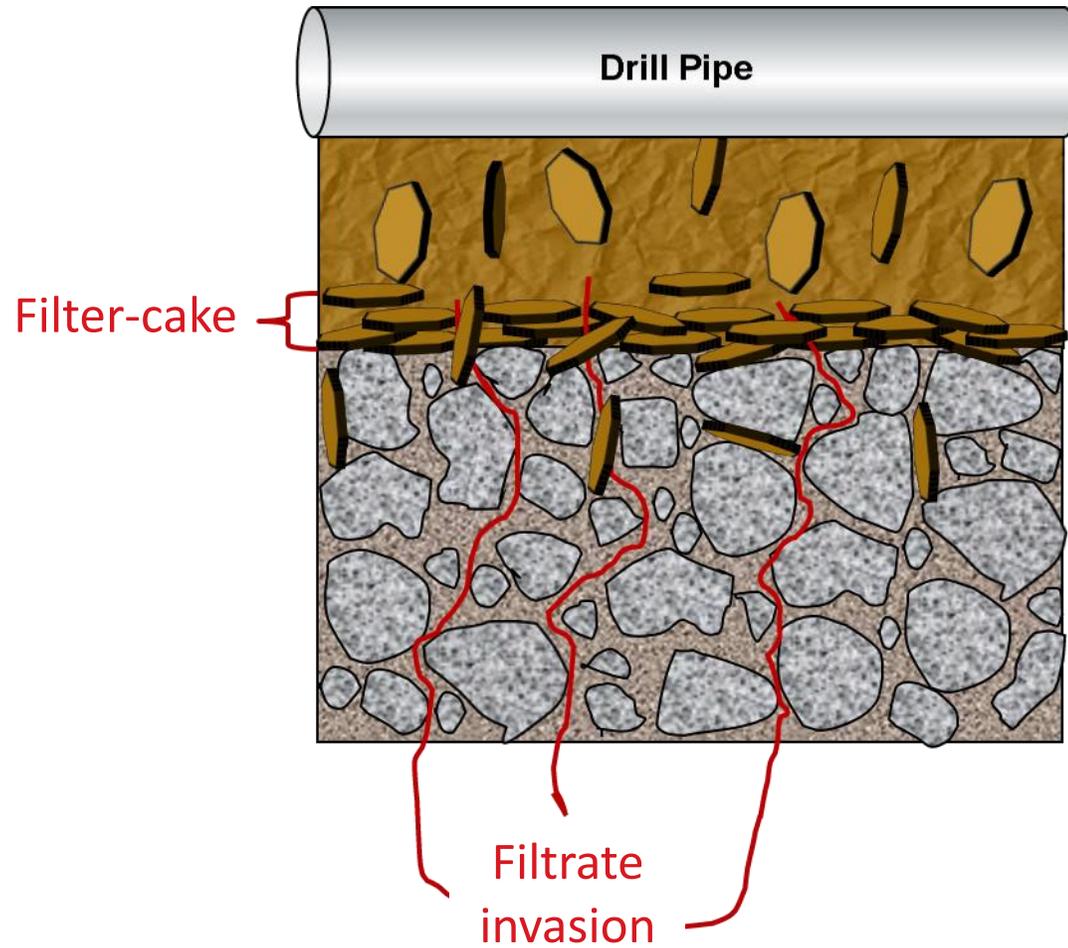
Filtration





# Bentonite

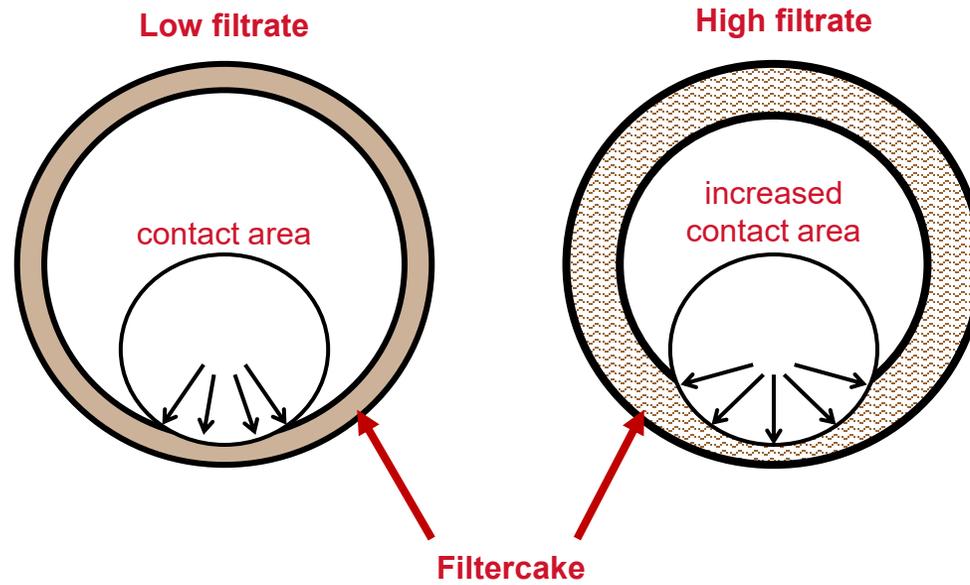
## Filtration





# Bentonite

## Filter cake

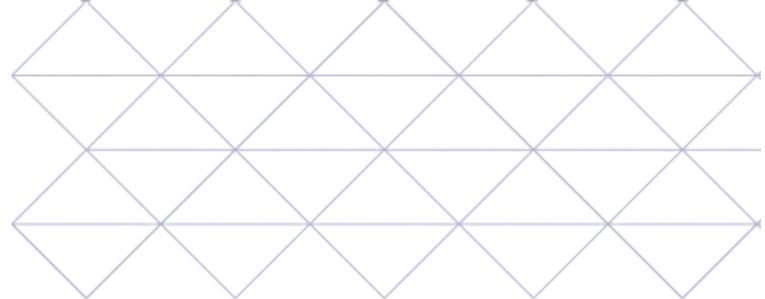




# Bentonite

Filtration





# Demo

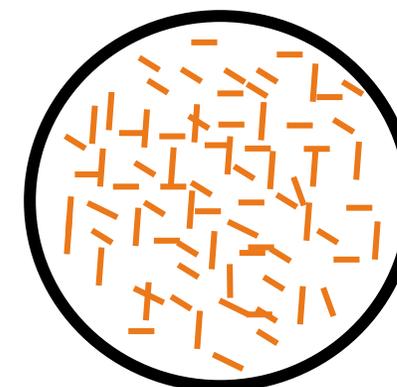
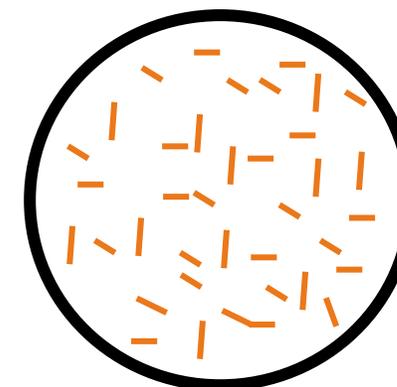
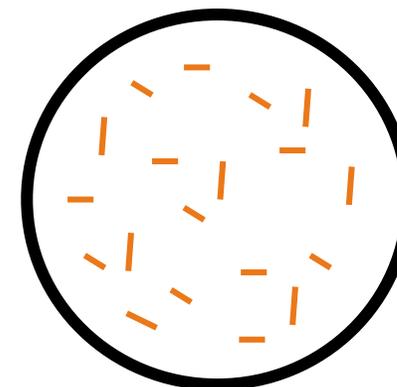
Filter cake build up on sand



# Bentonite

## Products

- Bentonite A
  - 25 – 30 kg/m<sup>3</sup>
  - Marsh Funnel Viscosity = +/- 60
- Bentonite B
  - 35 – 40 kg/m<sup>3</sup>
  - Marsh Funnel Viscosity = +/- 60
- Bentonite C
  - 60 – 70 kg/m<sup>3</sup>
  - Marsh Funnel Viscosity = +/- 60





# Bentonite

## Questions

