Lecture 14:

Chapter 19: Particle separation, filtration, and washing

• Objectives:
  – List 3 particle sizing techniques
  – Define the cutting size for cyclone/hydroclone technique
  – Define liquid specific permeability
  – Describe the filtration speed with time
  – List reasons for washing
Test 2 results:

High: 99
Low: 73
Average: 95.5
Particle Sizing

• Techniques:
  • Sieving
  • Cyclone and hydrocyclone
    • Cut size
  • Centrifuging

http://video.google.com/videosearch?q=screening+vibration&hl=en&emb=0&ap=f#q=sieving&hl=en&emb=0&start

http://video.google.com/videosearch?q=screening+vibration&hl=en&emb=0&aq=f#q=hydrocyclone&hl=en&emb=0

http://video.google.com/videosearch?q=centrifuging&hl=en&emb=0&aq=f#
Liquid Permeability

\[ Q = \frac{K_p A \Delta P}{\eta_f L} \]

\[ K_p = \frac{Q \eta_f L}{A \Delta P} \]

\[ K_p = \frac{\phi R_L^2}{K_L} \]
Filter press

http://video.google.com/videosearch?q=screening+vibration&hl=en&emb=0&aq=f#q=filter%20press&hl=en&emb=0
Filtration

\[ \frac{dL}{dt} = \frac{J}{A} \frac{dV_f}{dt} \]

\[ Q = \frac{K_p A \Delta P}{\eta_f L} = \frac{dV_f}{dt} \]

\[ \frac{L^2}{t} = \frac{2JK_p \Delta P}{\eta_f} \]

how to speed up the filtering?

\[ L = \sqrt{\frac{2JK_p \Delta P t}{\eta_f}} = Ct^{1/2} \]
Washing

Purpose of washing:
HW

• Reading: Chapter 20 and 21

• Due in 1 week: 19.3, 19.5, 19.6,