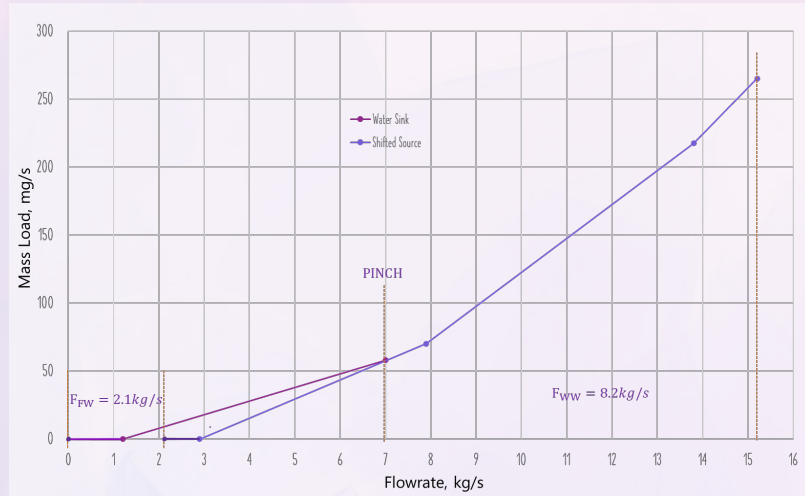


Water Composite Curves

- Mass load vs flowrate graph
- Demand composite curve on top of source composite curve



Water Cascade Analysis

- Obtains water utility target using algebraic approach
- Arrange according to ascending concentration

k	C _k (ppm)	ΔC _k	F _j (kg/s)	F _i (kg/s)	F _i - F _j (kg/s)

First Cascade				Second Cascade		
F _{cascade}	Δm	Δm cascade	Δm cascade / C _k	F _{cascade}	Δm	Δm cascade

CHAPTER 7

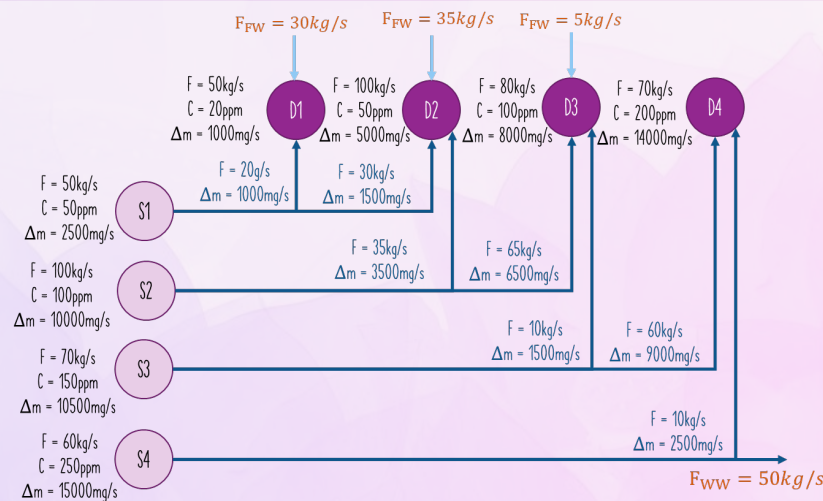
Process Integration

Water Pinch Analysis

A systematic technique to analyse water networks and identify opportunities to increase efficient use of water in industrial processes.

Water Network Design

- Feed the cleanest demand with the cleanest water source
- Must obtain freshwater and waste water flowrate from water targeting
- Arrange streams in ascending concentration values
- Must satisfy overall material balance



Dr Nurul Haiza Sapiee

Water Utility Targeting Techniques

- Water composite curves
- Water cascade analysis (WCA)

Mass Load Concepts

- Water starts clean and contamination increases due to mass transfer
- Mass load depends on flowrate and concentration of water $\Delta M = F \Delta C$

