

Multiphase Flow and Heat Transfer



Introduction

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Prerequisites: Thermodynamics, Heat and Mass Transfer

References

- Van P Carey, *Liquid-Vapor Phase-Change Phenomena*, Second Edition, CRC Press, Taylor & Francis, 2007.
- Incropera FP and Dewitt DP, *Fundamentals of Heat and Mass Transfer*, Fifth edition, John Wiley and Sons, 2010.
- Mostafa G, *Two-Phase Flow, Boiling and Condensation*, Cambridge University Press.
<http://dx.doi.org/10.1017/CBO9780511619410>

Class Timings: ME546

Mon, Tue: 11 AM to 12 PM Room-105
Fri: 12 PM to 1 PM, Room-105

Course Material: <http://www.iitp.ac.in/~sudheer/teaching.html>



Pool Boiling

- Classification
- Boiling Regimes
- Correlations
- Enhancement of Boiling Heat Transfer

Degasification

- Henry's law
- Degassing Techniques

Liquid-vapor interface

- Interfacial tension
- Capillary, Interface shape

Wettability

- Contact angle
- Bubble formation

Condensation

Two phase flow

- Flow regimes
- Flow models



Phase

Macroscopic state of matter which is homogeneous in chemical composition and physical structure. Gas, Liquid & Solid.

Gas-Liquid

Steam and water; Air and water

Liquid-Solid

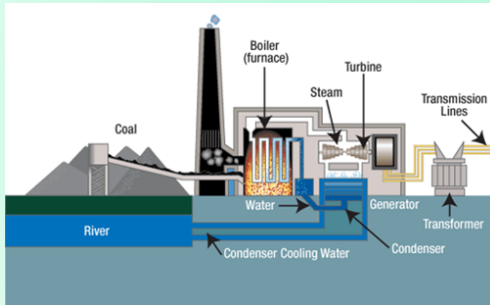
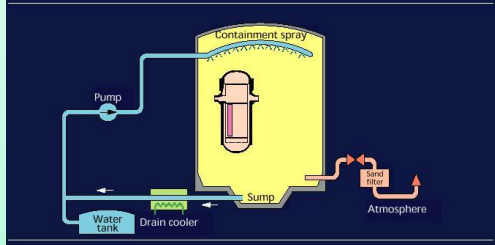
Plasma and platelets (Blood)

Liquid-Liquid

Oil and water

Spray cooling "Emergency Shutdown" of nuclear power plant

CONTAINMENT SPRAY SYSTEM



Steam power plant



- Steam generators and condensers
- Steam turbines (power plants)
- Coal fired furnaces
- Refrigeration
- Liquid sprays
- Cryogenics
- Material processing - Quenching
- Process plants - Chemical/petroleum
- Electronic component cooling
- Medical applications

- Dust storms
- Rain, Clouds, snow
- Ocean waves
- Geysers, boiling water
- Inkjets
- Tire splash
- Sloshing

