

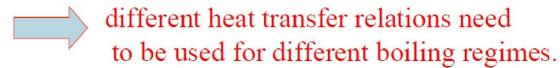
### SNS COLLEGE OF TECHNOLOGY COIMBATORE-35 DEPARTMENT OF FOOD TECHNOLOGY



Topic - Correlations in boiling

# Heat Transfer Correlations in Pool Boiling

Boiling regimes differ considerably in their character



• In the *natural convection boiling* regime heat transfer rates can be accurately determined using natural convection relations.



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## Heat Transfer Correlations in Pool Boiling — Nucleate Boiling

- No general theoretical relations for heat transfer in the nucleate boiling regime is available.
- · Experimental based correlations are used.
- The rate of heat transfer strongly depends on the nature of nucleation and the type and the condition of the heated surface.
- A widely used correlation proposed in 1952 by Rohsenow:

$$q_{s}^{"} = \mu_{l} h_{fg} \left[ \frac{g(\rho_{l} - \rho_{v})}{\sigma} \right]^{1/2} \left( \frac{c_{p,l} \Delta T_{e}}{C_{s,f} h_{fg} \operatorname{Pr}_{l}^{n}} \right)^{3}$$

## Heat Transfer Correlations in Pool Boiling — Nucleate Boiling

- The values in Rohsenow equation can be used for *any geometry* since it is found that the rate of heat transfer during nucleate boiling is essentially independent of the geometry and orientation of the heated surface.
- The correlation is applicable to *clean* and relatively *smooth* surfaces.
- Error for the heat transfer rate for a given excess temperature: 100%.
- Error for the excess temperature for a given heat transfer rate for the heat transfer rate and by 30%.



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- 3. MIT open courseware <a href="https://ocw.mit.edu/courses/mechanical-engineering">https://ocw.mit.edu/courses/mechanical-engineering</a>

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