

# Refrigeration & Air Conditioning

Aashique Alam Rezwan  
Lecturer

Dept. of Mechanical Engineering, BUET

<http://teacher.buet.ac.bd/aashiquear>



# What is Refrigeration?

- Artificial withdrawal of heat
- Producing in a substance or within a space a temperature lower than that which would exist under the natural influence of the surrounding
- Dehumidifying



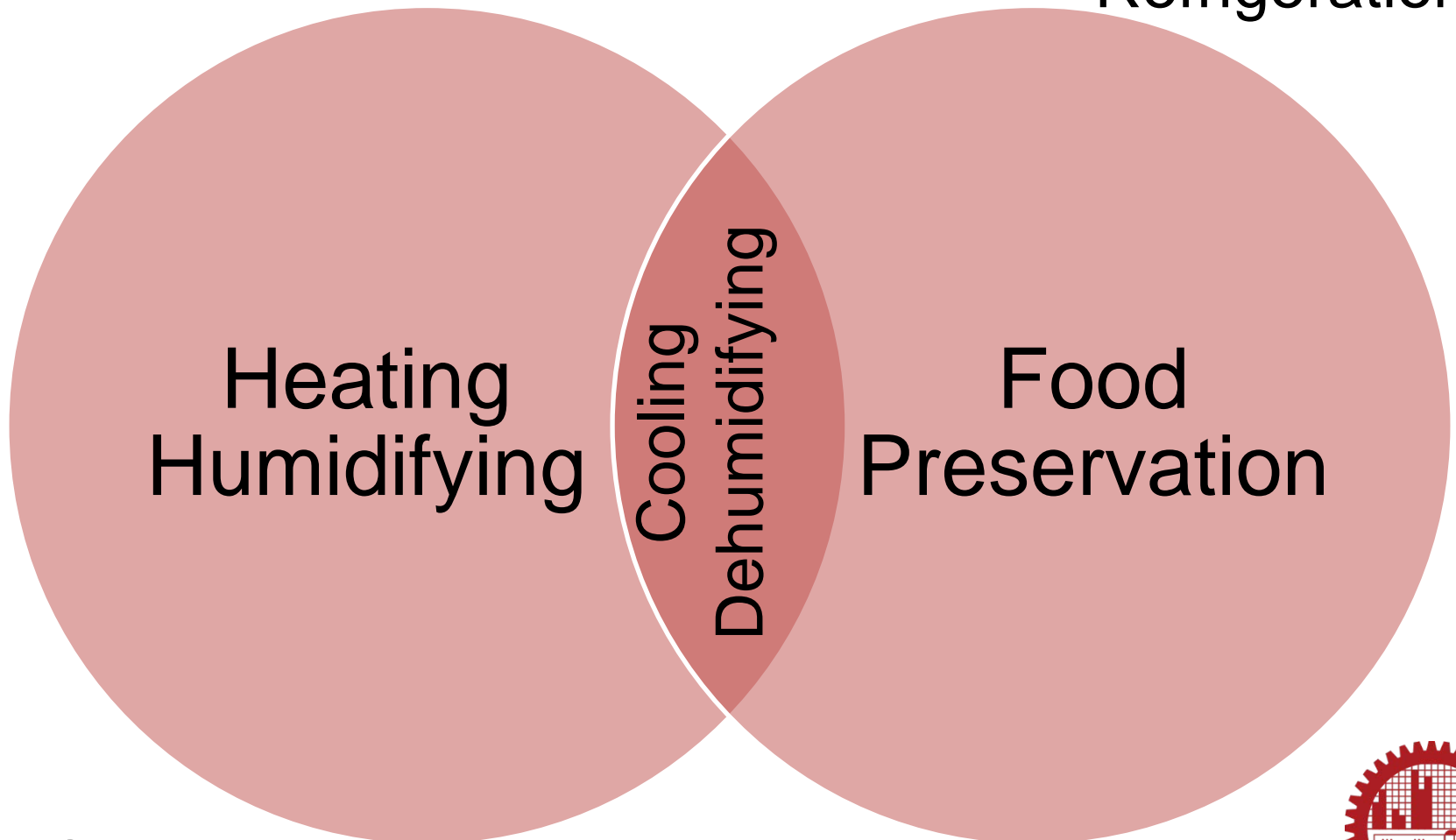
# What is Air Conditioning?

- Artificial tampering of the conditions of air
  - Cooling
  - Heating
  - Ventilation
  - Filtration
  - Air circulation
  - Dehumidifying



# Relationship of Ref. & A/C

Refrigeration



Air Conditioning



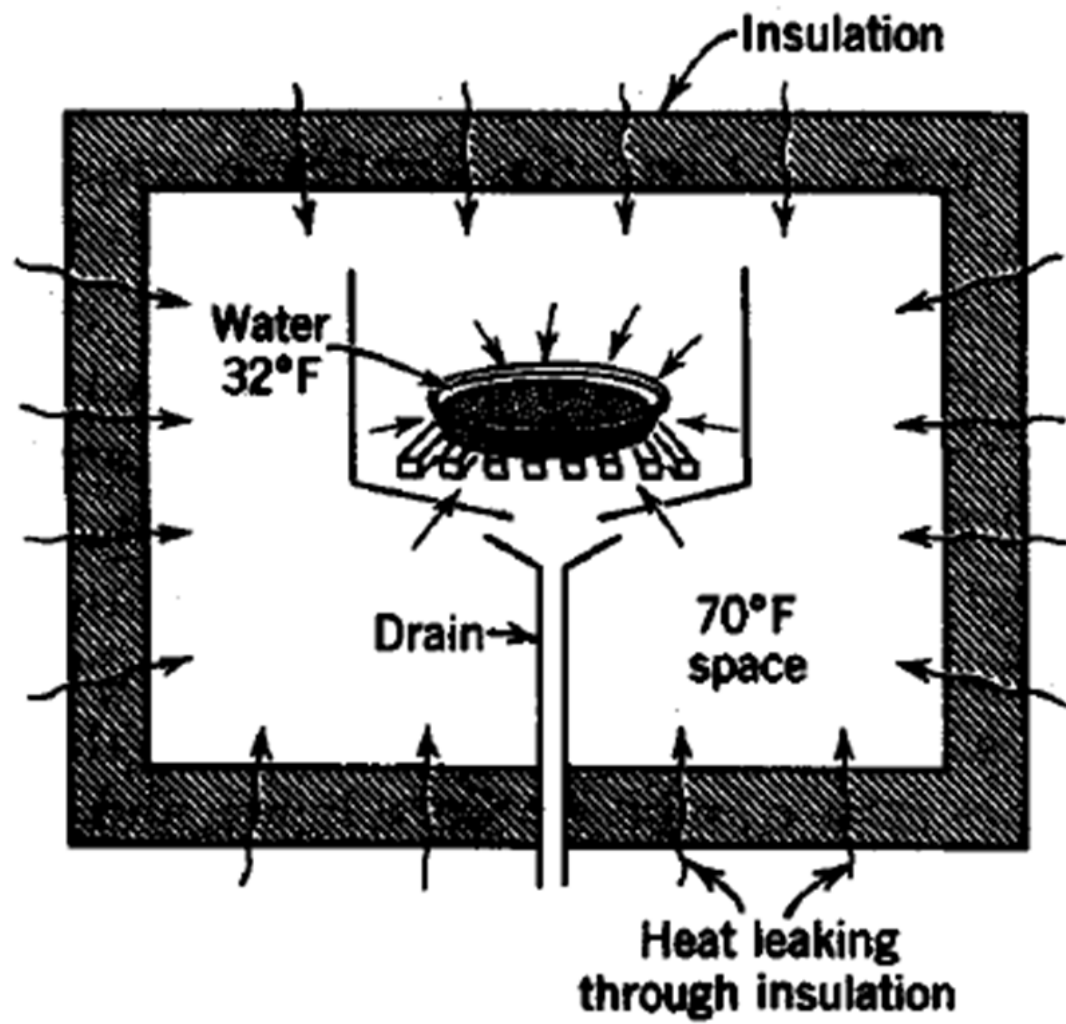
# Classification of Application

- Domestic Refrigeration
- Commercial Refrigeration
- Industrial Refrigeration
- Marine & Transportation Refrigeration
- Comfort Air Conditioning
- Industrial Air Conditioning



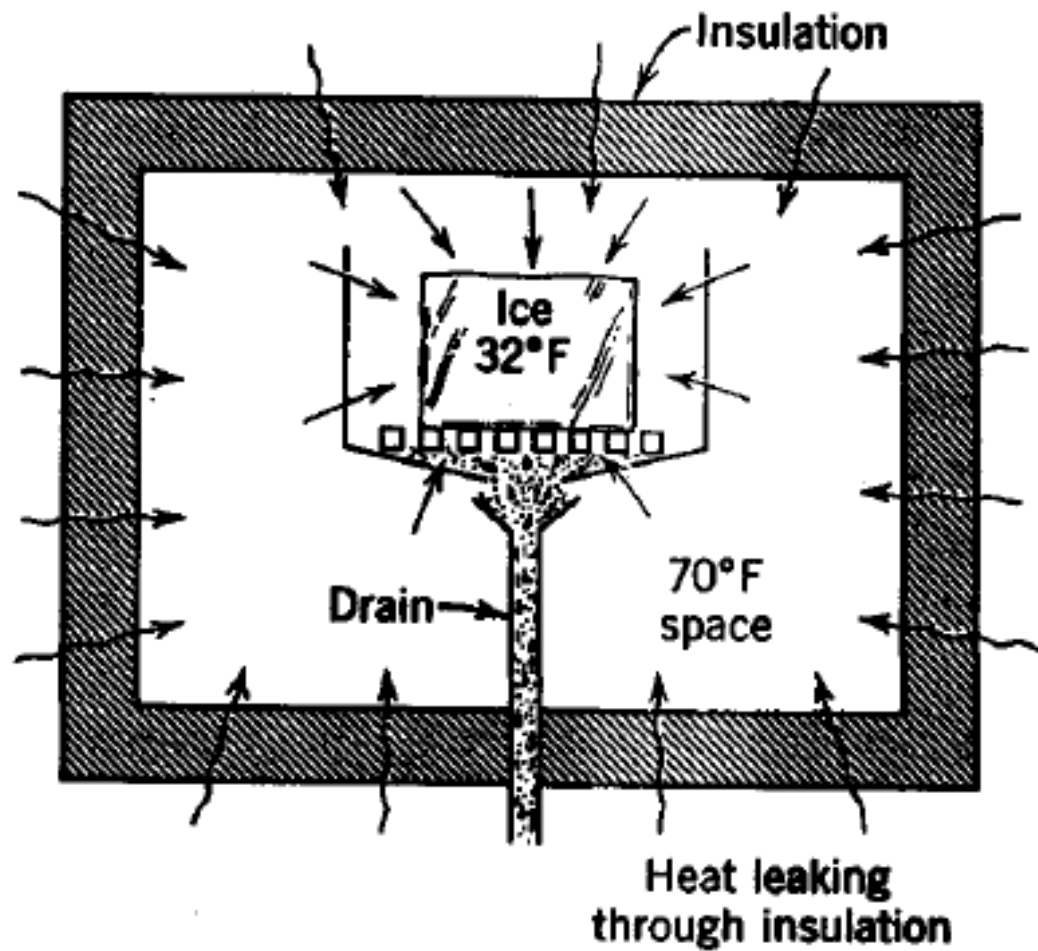
# VAPOR COMPRESSION REFRIGERATION





Heat flows from warm space to colder water. Water temperature rises as space temperature decreases. Refrigeration will not be continuous

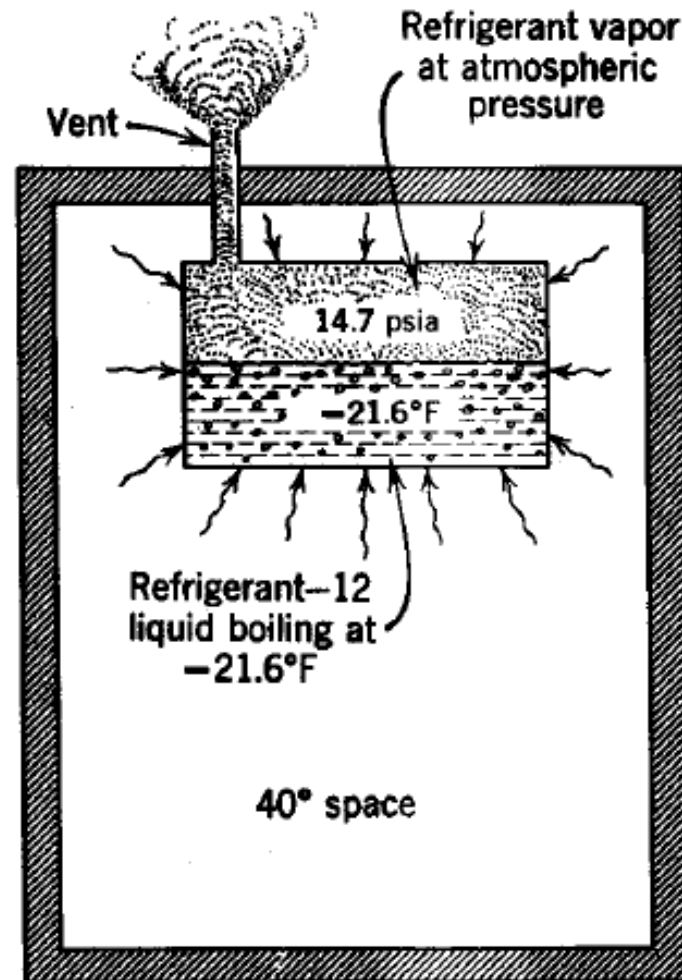




Heat flows from warm space to cold ice. Temperature of space decreases as ice melts. Temperature of ice remains at 32F (0C). Heat absorbed by ice leaves space in water going out the drain.

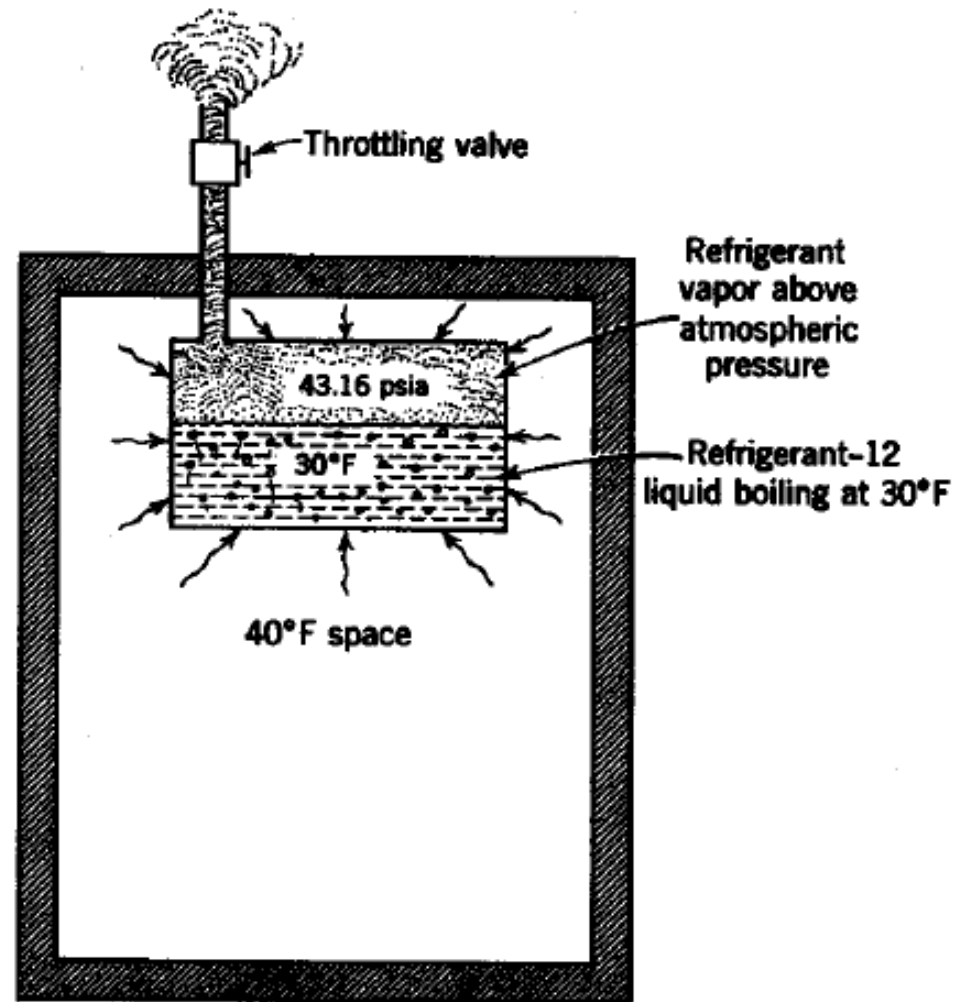
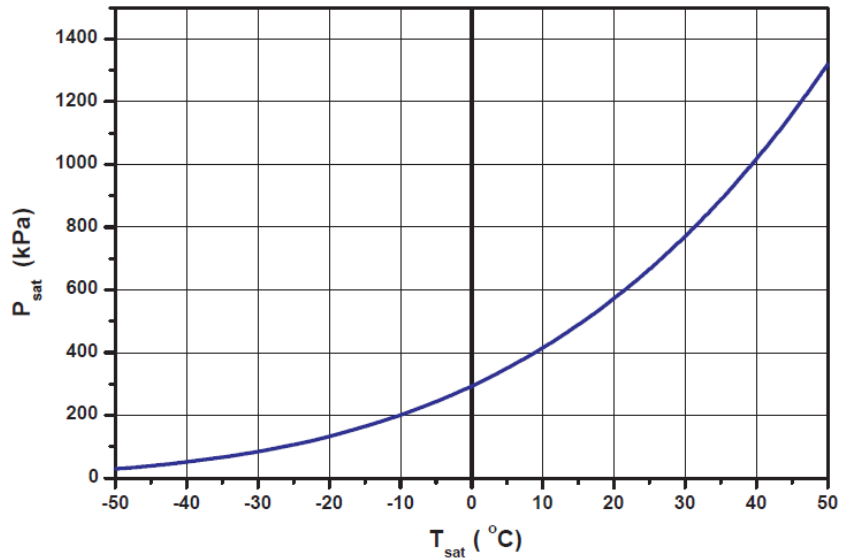






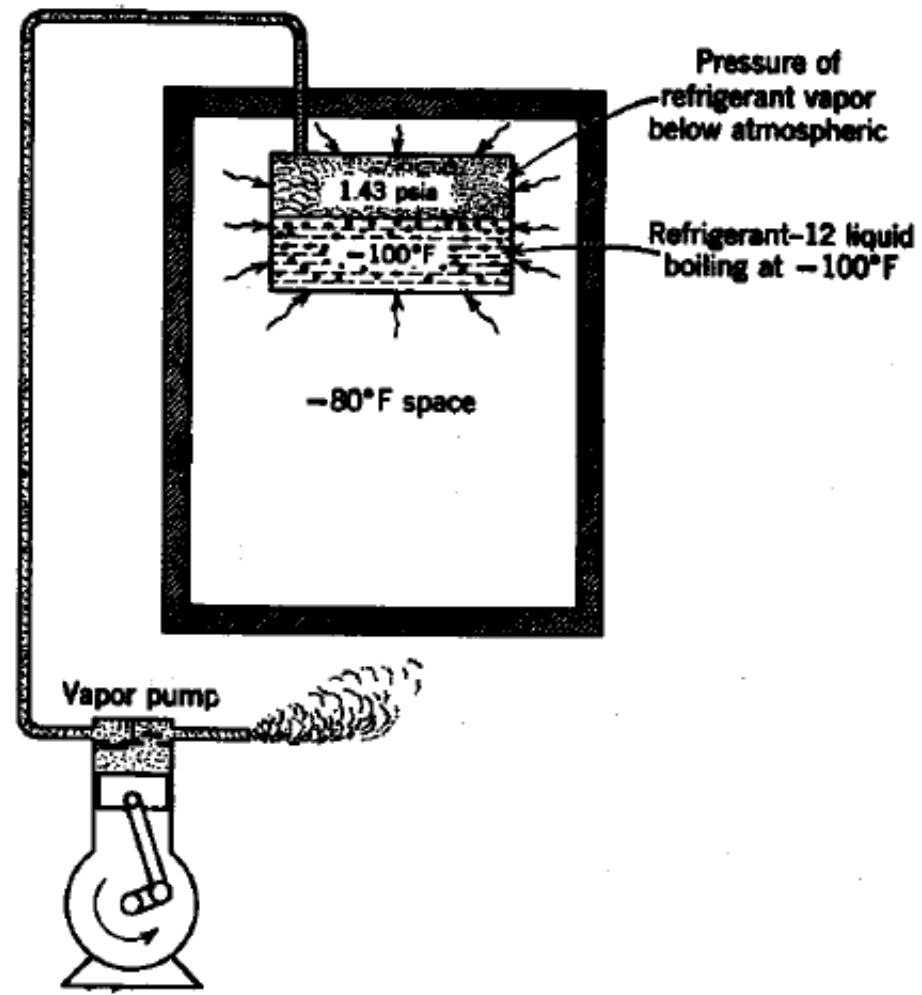
The Refrigerant 134a liquid vaporizes as it takes in heat from the  $40^{\circ}\text{F}$  space. The heat taken in by the refrigerant leaves the space in the vapor escaping through the vent





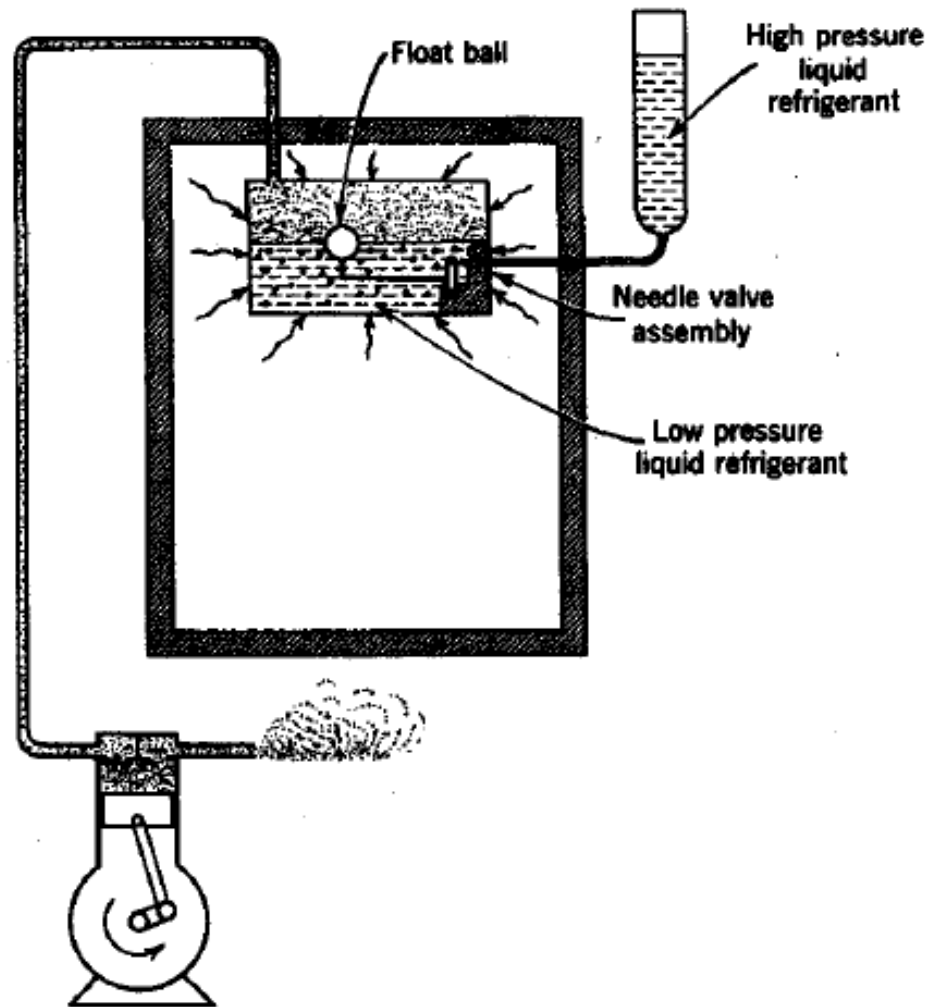
The boiling temperature of the liquid refrigerant in the evaporator is controlled by controlling the pressure of the vapor over the liquid with the throttling valve in the vent.





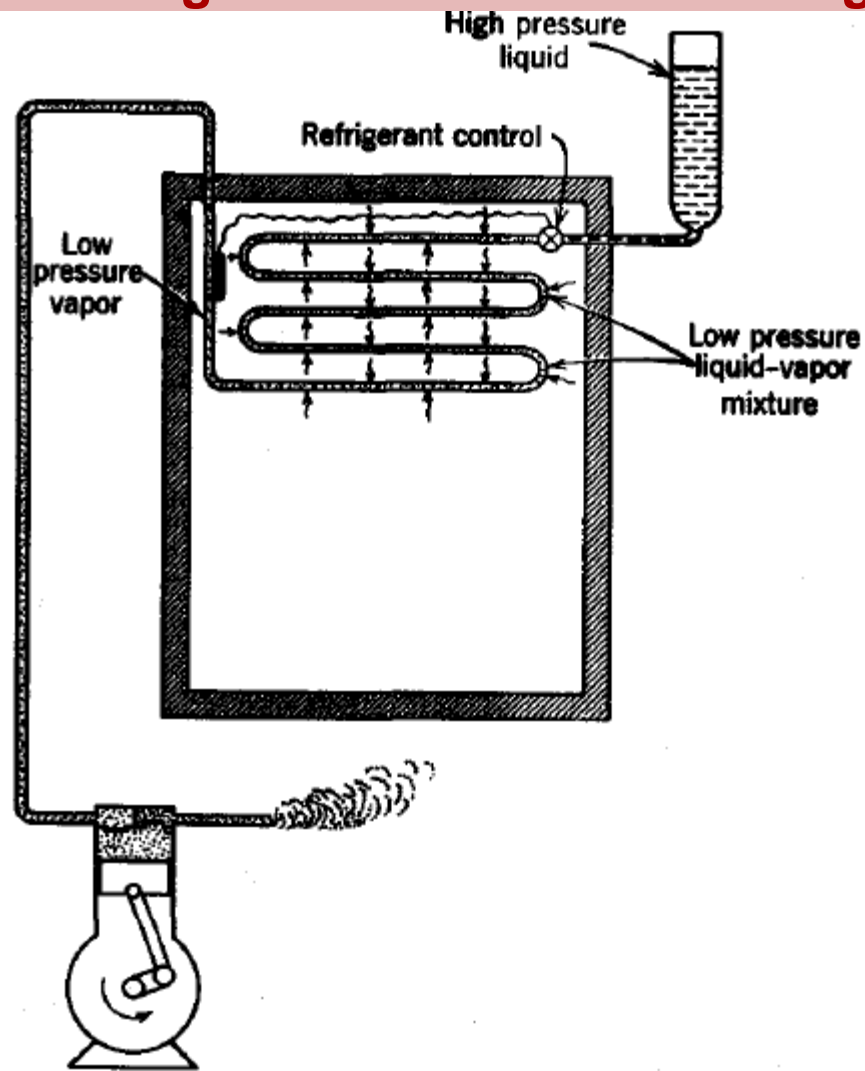
Pressure of refrigerant in evaporator reduced below atmospheric by action of a vapor pump.





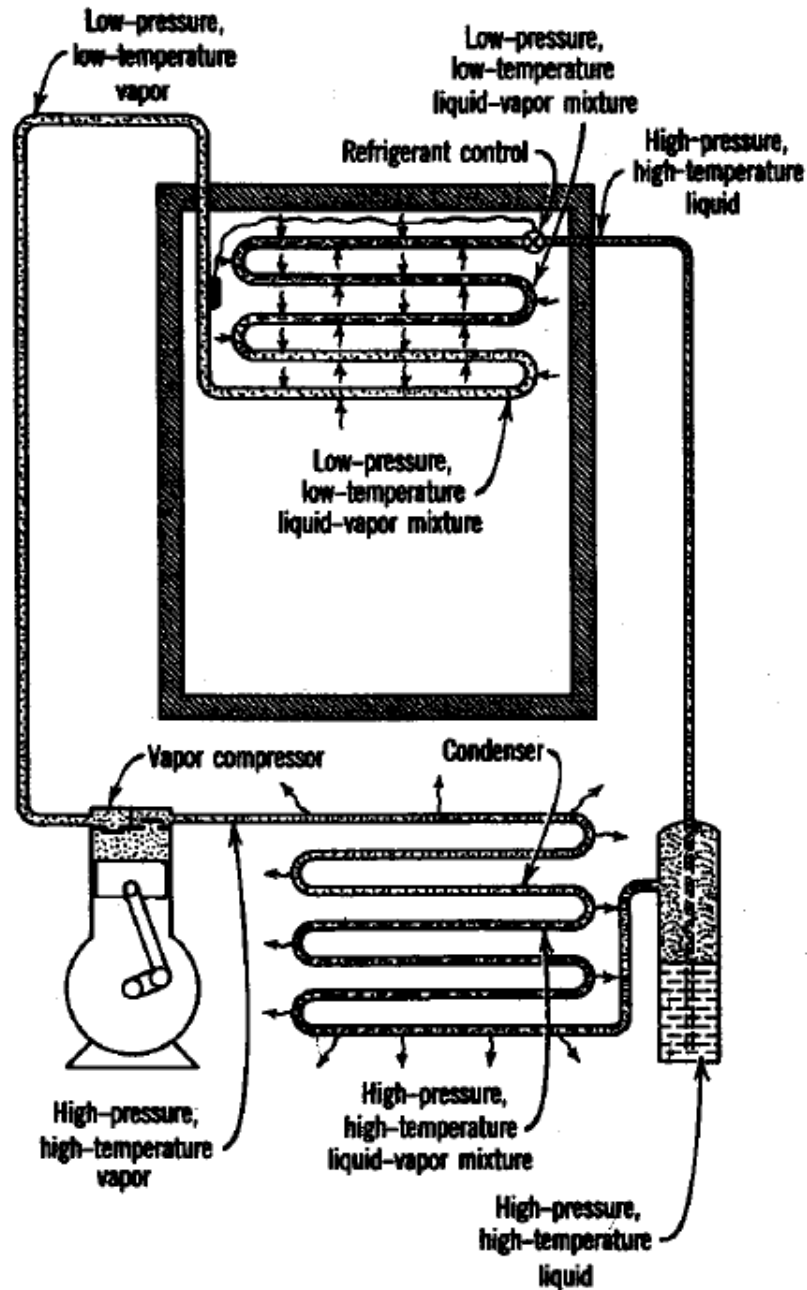
Float valve assembly maintains constant liquid level in evaporator. The pressure of the refrigerant is reduced as the refrigerant passes through the needle valve.

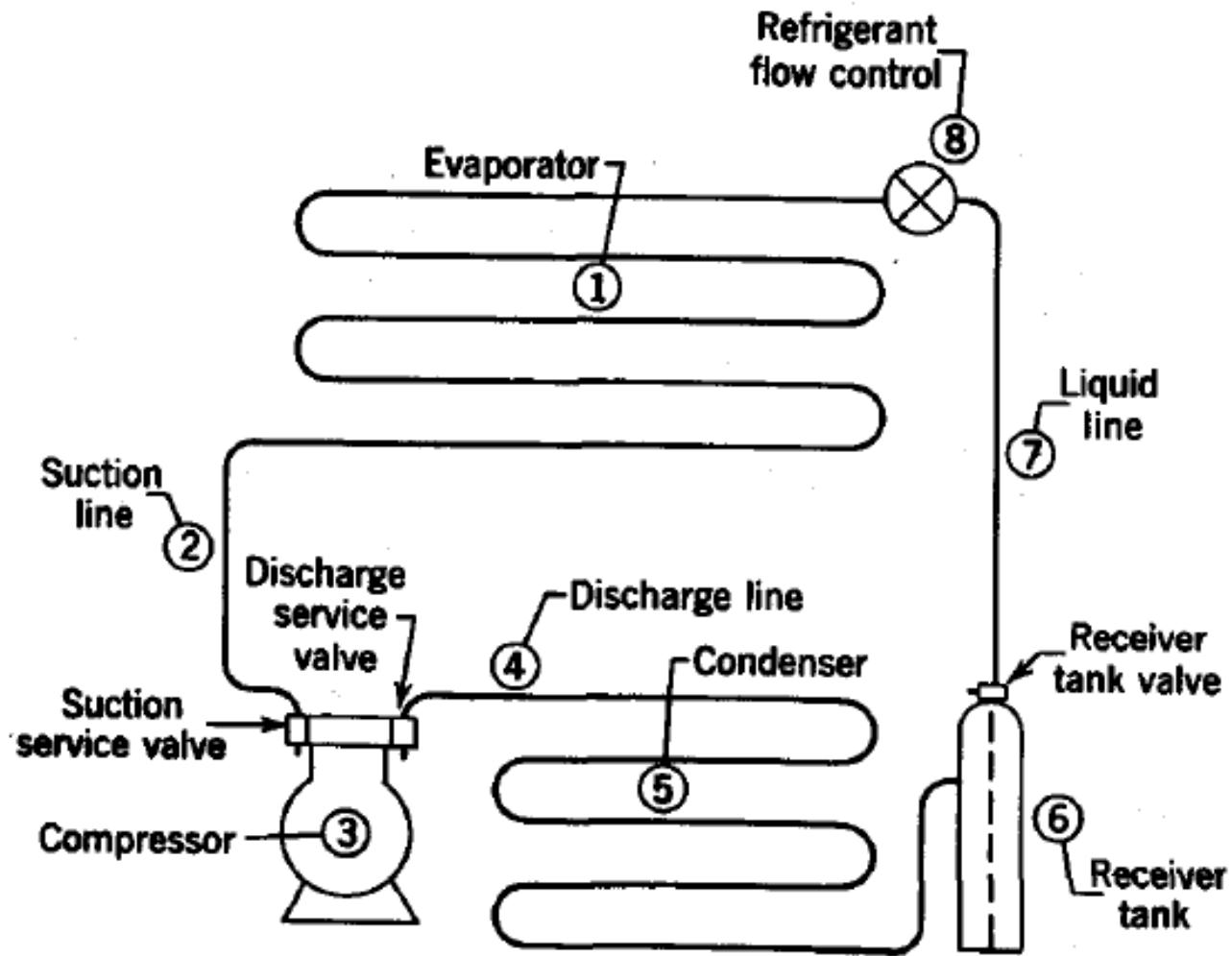




Serpentine coil evaporator with thermostatic expansion valve refrigerant control.

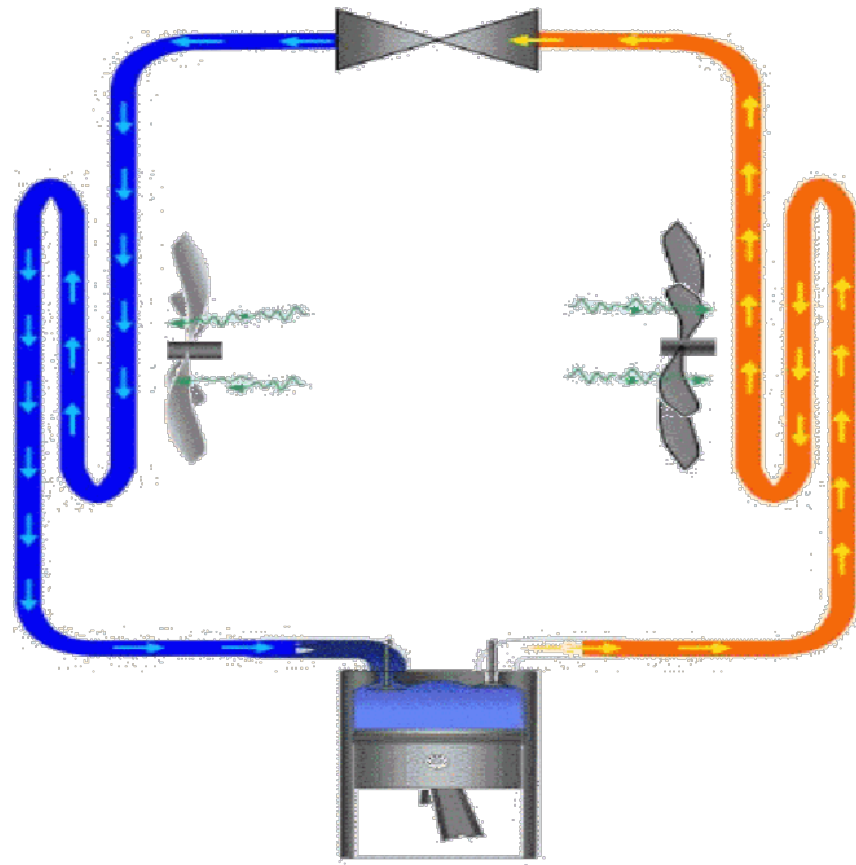






Flow diagram of simple vapor compression system showing the principle parts

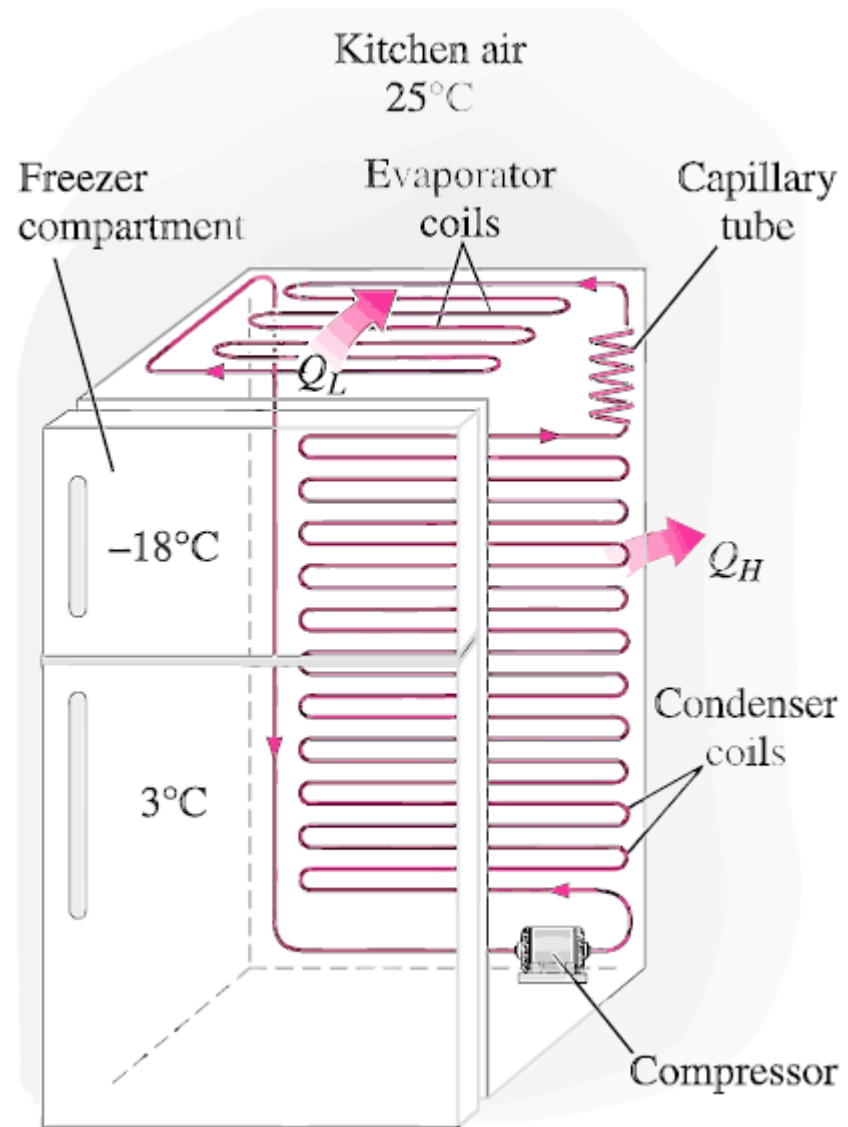






## Key Component of Refrigerator

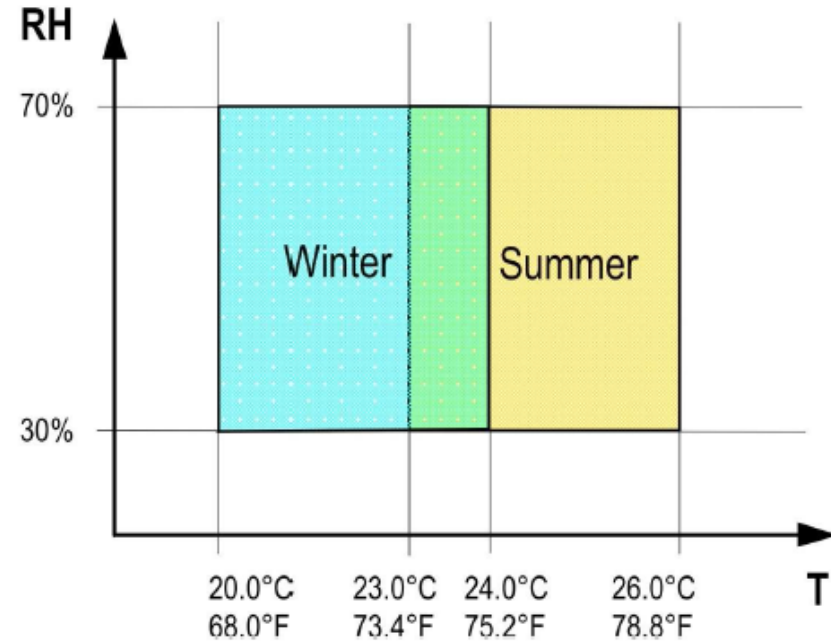
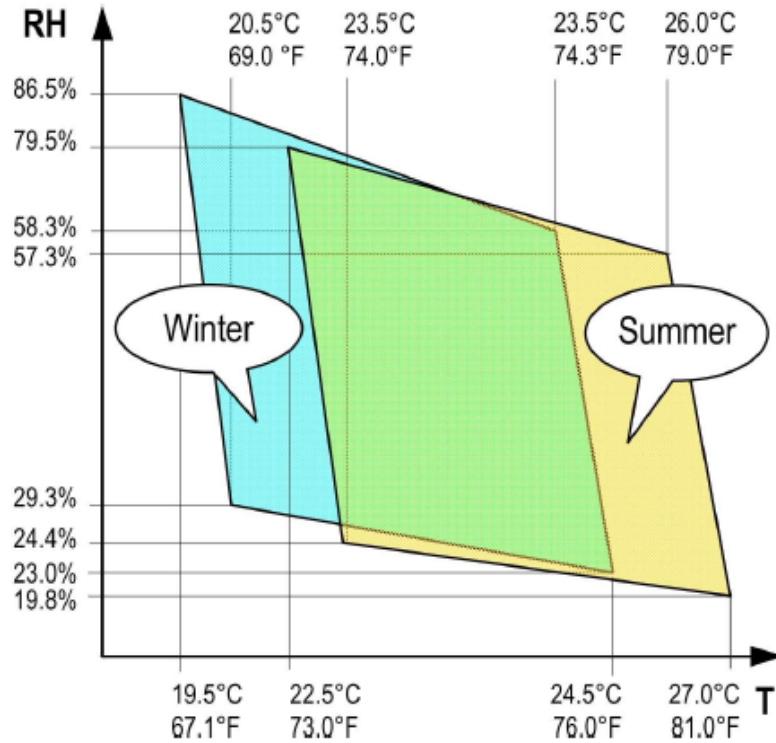
1. Evaporator
2. Suction line
3. Vapor compressor
4. Hot gas/discharge line
5. Condenser
6. Receiver tank
7. Liquid line
8. Refrigerant flow control device



# AIR CONDITIONING



# Thermal Comfort



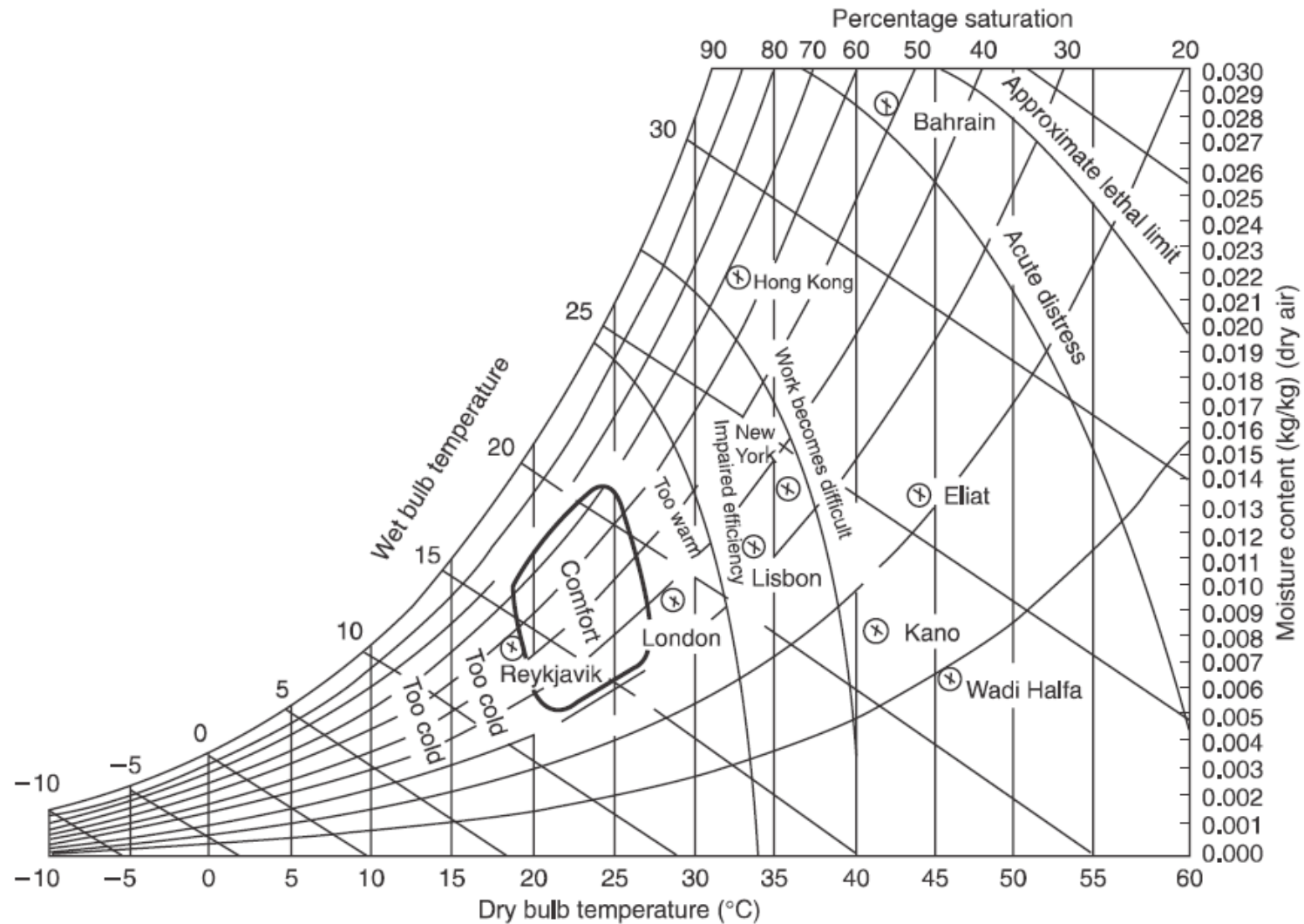
Comfort zone according to ISO 7730

Comfort zone according to ASHRAE 55-1992

- Thermal comfort is defined as that condition of mind which expresses satisfaction with the thermal environment.

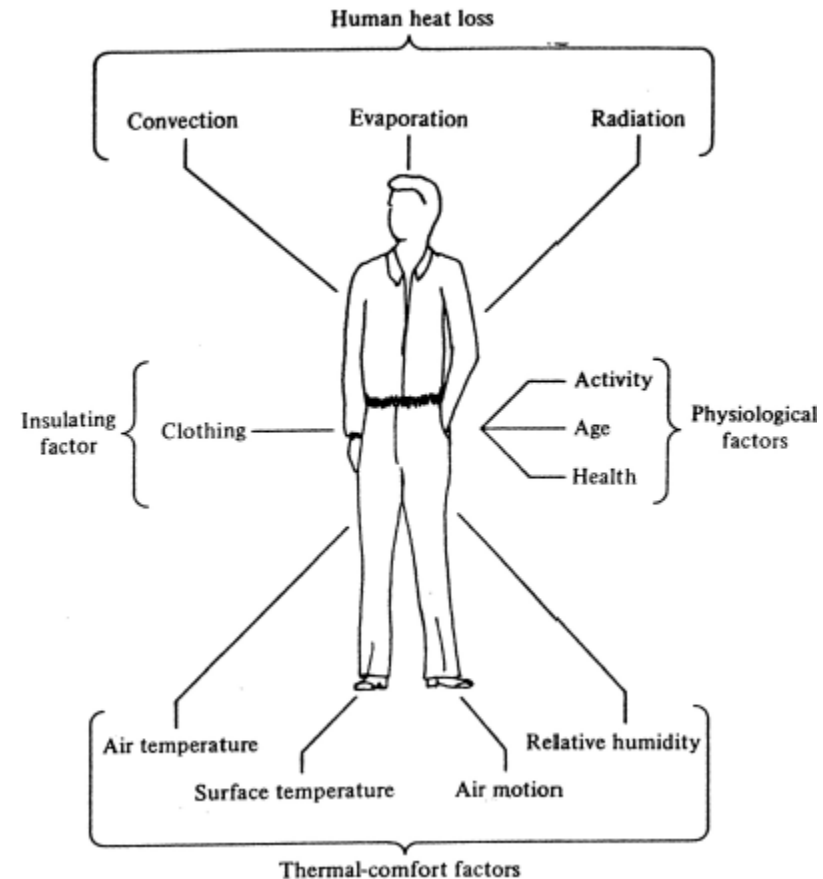


# Typical Climate Condition

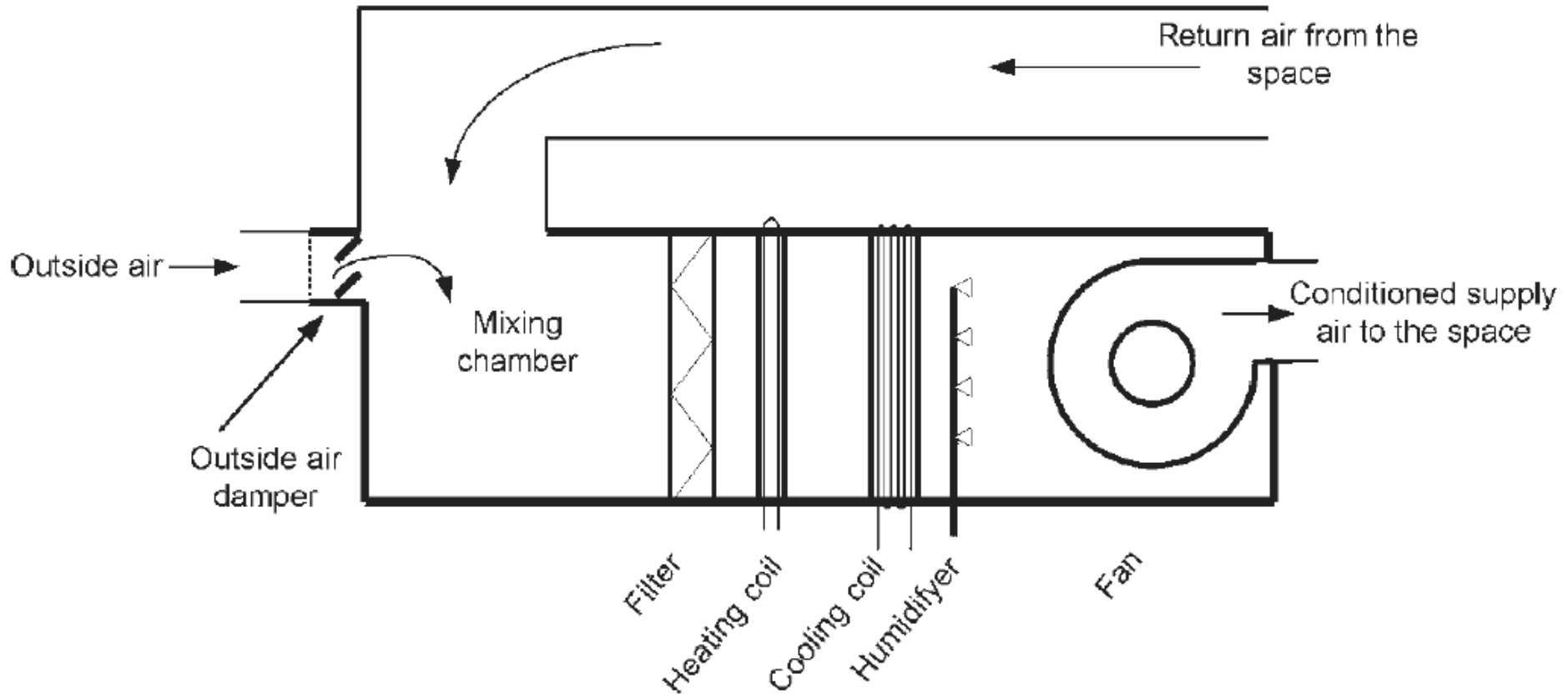


# Factors Affecting Thermal Comfort

1. Activity level
2. Clothing
3. Expectation
4. Air temperature
5. Radiant temperature
6. Humidity
7. Air speed



# Basic Air Conditioning System



**THANK YOU**

