

6.11 Required Properties of Ideal Refrigerant:

- 1) *The refrigerant should have low boiling point and low freezing point.*
- 2) *It must have low specific heat and high latent heat. Because high specific heat decreases the refrigerating effect per kg of refrigerant and high latent heat at low temperature increases the refrigerating effect per kg of refrigerant.*
- 3) *The pressures required to be maintained in the evaporator and condenser should be low enough to reduce the material cost and must be positive to avoid leakage of air into the system.*
- 4) *It must have high critical pressure and temperature to avoid large power requirements.*
- 5) *It should have low specific volume to reduce the size of the compressor.*
- 6) *It must have high thermal conductivity to reduce the area of heat transfer in evaporator and condenser.*
- 7) *It should be non-flammable, non-explosive, non-toxic and non-corrosive.*
- 8) *It should not have any bad effects on the stored material or food, when any leak develops in the system.*
- 9) *It must have high miscibility with lubricating oil and it should not have reacting properly with lubricating oil in the temperature range of the system.*
- 10) *It should give high COP in the working temperature range. This is necessary to reduce the running cost of the system.*
- 11) *It must be readily available and it must be cheap also.*

Important Refrigerants:

Properties at -15°C

(1) Ammonia (NH_3)(R-717)

Latent heat = 1312.75 kJ/Kg

Specific volume = $0.509 \text{ m}^3/\text{kg}$

(2) Dichloro–Difluoro methane (Freon–12) (R-12) [$\text{C Cl}_2 \text{ F}_2$]

Latent heat = 162 kJ/Kg

Specific volume = $0.093 \text{ m}^3/\text{kg}$

(3) Difluoro monochloro methane – or Freon-22 (R-22) [CH Cl F_2]

Latent heat = 131 kJ/Kg

Specific Volume = $0.15 \text{ m}^3/\text{kg}$.