MeTech

PSYCHROMETRY

- Air Conditioning (वातानुकूलन)
- Psychrometry (साइक्रोमेट्री)
- Specific Humidity (विशिष्ट आद्रता)
- Relative Humidity (सापेक्ष आद्रता)
- Degree Of Saturation(संतृप्ति की मात्रा)

By - Saumya Mishra

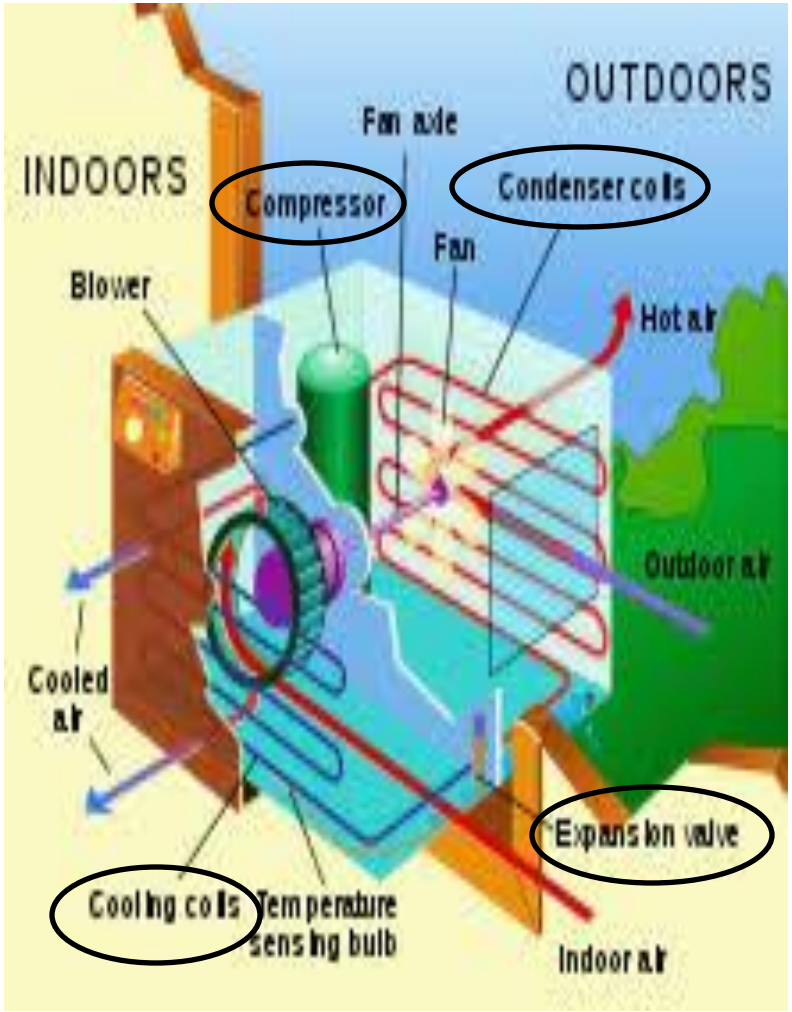
AIR CONDITIONING(वातानुकूलन)

To control the

- Temperature
- Humidity
- Cleanliness
- Air Motion

According to desired value

वातानुकूलन एक तकनीक है जिसके स्थान पर वायु का तापमान, आद्रता ,स्वछता , व् वायु की गति आवश्यता अनुसार नियंत्रित किये जाते है।



Application of Air conditioning (वातानुकूलन के उपयोग)

1. Comfort Air Conditioning(सुखद वातानुकूलन)
   - Summer Air Conditioning: it involves Cooling & dehumidification(ग्रीष्मकालीन वातानुकूलन)
   - Winter Air Conditioning : it invoves Heating & humidification(शीतकालीन वातानुकूलन)
2. Industrial Air Conditioning(औद्यौगिक वातानुकूलन)

Psychrometry (साइक्रोमेट्री)

Psychrometry is the study of the properties of mixtures of air and water vapour. Atmospheric air is a mixture of many gases plus water vapour and a number of pollutants.

वायु एवं जल वाष्प के मिश्रण के गुणवत्ता का अध्ययन करना साइक्रोमेट्री कहलाता है।

Terms Used In Psychrometry

1. Dry Air(शुष्क वायु)
2. Moist Air(नमवायु)
3. Saturated Air(संतृप्त वायु) : Air that contains the maximum amount of water vapour that is possible at the given temperature and pressure, i.e. air in which the relative humidity is 100%.

Psychrometry Terms Continued...

4. Specific Humidity or Humidity Ratio (ω):

(विशिष्ट आद्रता)

Specific humidity is the ratio of mass of water vapor mass to the mass of dry air in whole mixture.

$$(\text{humidity ratio}) = \frac{(\text{mass of water vapor})}{(\text{mass of dry air})}$$

$$\omega = \frac{m_v}{m_a}$$

$$\omega = \frac{m_v}{m_a} = \frac{P_v V / R_v T}{P_a V / R_a T} = \frac{P_v / R_v}{P_a / R_a} = 0.622 \frac{P_v}{P_a} = 0.622 \frac{P_v}{P - P_v}$$

5. RELATIVE HUMIDITY (φ):

(सापेक्ष आद्रता)

IT IS THE AMOUNT OF WATER VAPOUR PRESENT IN AIR EXPRESSED AS A PERCENTAGE OF THE AMOUNT NEEDED FOR SATURATION AT THE SAME TEMPERATURE.

$$(\text{relative humidity}) = \frac{(\text{mass of water vapor})}{(\text{mass of water vapor in saturation})}$$

$$\phi = \frac{m_v}{m_g(T)}$$

$$\phi = \frac{m_v}{m_g(T)} = \frac{P_v V / R_v T}{P_g V / R_v T} = \frac{P_v}{P_g(T)}$$

$$\text{RH} = \frac{P_{H_2O}}{P_{H_2O,\,\text{sat}}(T)}$$

- Obtain the saturated pressure $P_g(T)$ from the steam table.
- **Dry air**. Relative humidity = 0%
- **Air saturated with water**. Relative humidity = 100%
- **Human comfort**. Relative humidity = 40-60%

6. Degree of Saturation (μ) (संतृप्ति की मात्रा): It is the ratio of humidity ratio of moist air to the humidity of saturated moist air. Degree of saturation ranges from 0 to 1 and relative humidity ranges from 0 to 100.

$$\mu = \frac{\omega}{\omega_g} = \frac{0.622\dfrac{p_v}{p - p_v}}{0.622\dfrac{p_g}{p - p_g}}$$

$$\mu = \frac{p_v}{p_g}\left(\frac{p - p_g}{p - p_v}\right)$$

$$\mu = \frac{p_v}{p_g}\left(\frac{1 - \dfrac{p_g}{p}}{1 - \dfrac{p_v}{p}}\right)$$

$$\mu = \phi\left(\frac{1 - \dfrac{p_g}{p}}{1 - \dfrac{p_v}{p}}\right)$$

Thankyou…