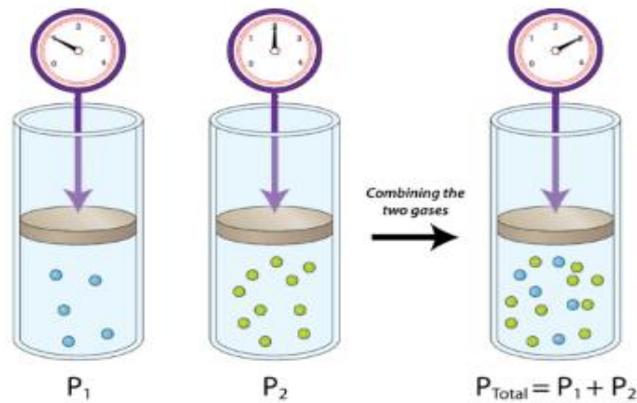


DALTON'S LAW OF PARTIAL PRESSURES

It states that “*The **total pressure** by a mixture of gases is equal to the sum of the **partial pressures** of each of the constituent gases*”.

The **partial pressure** is defined as the **pressure** each gas would exert if it alone occupied the volume of the mixture at the same temperature.



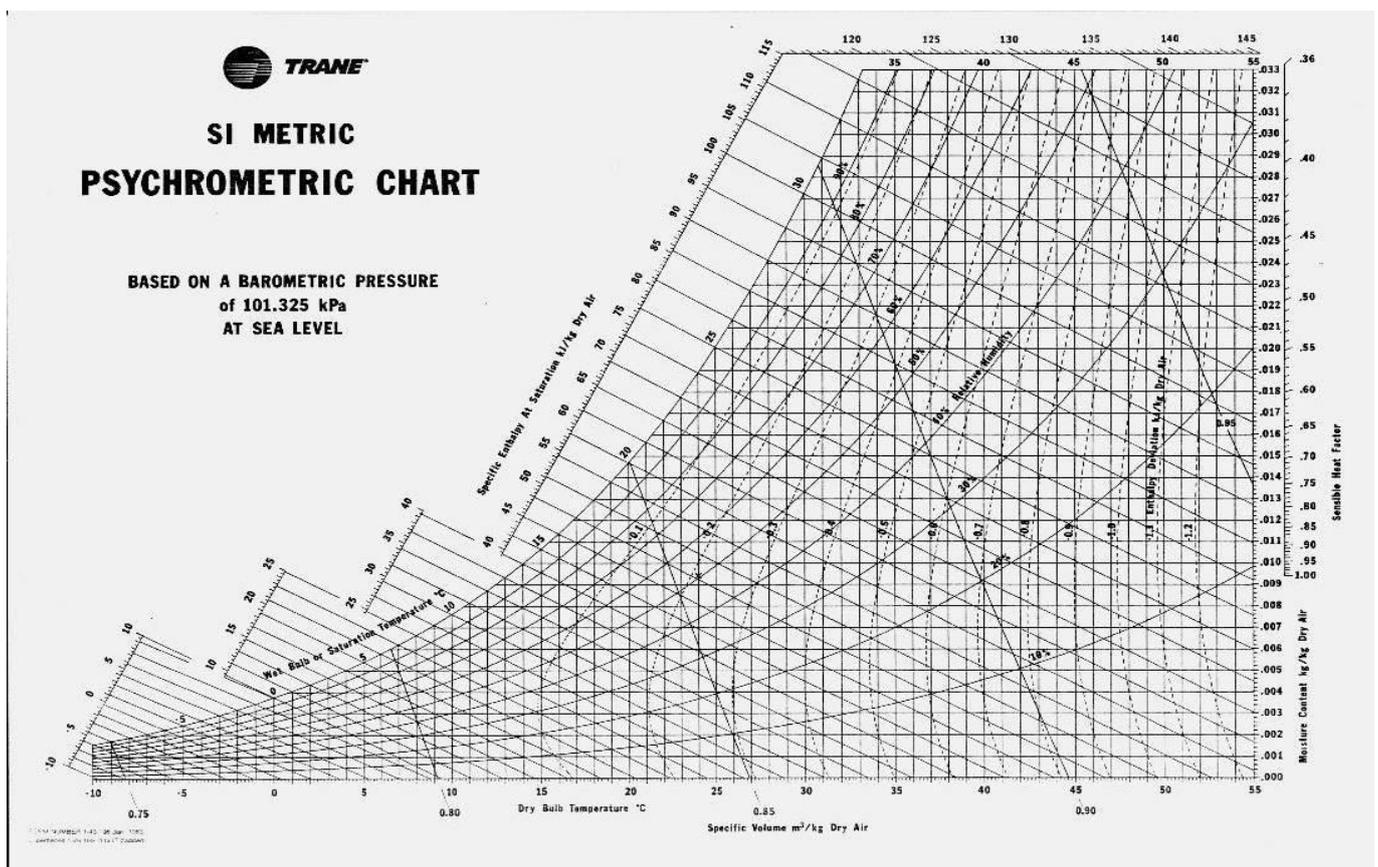
Dalton's law of partial pressures can be mathematically expressed as follows:

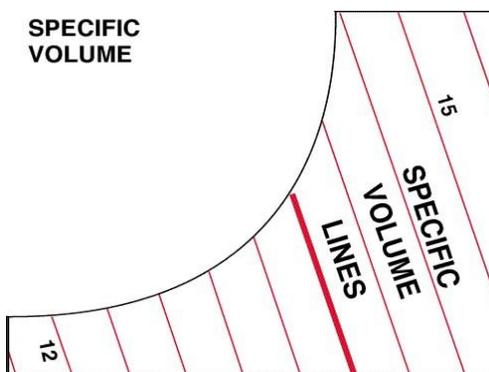
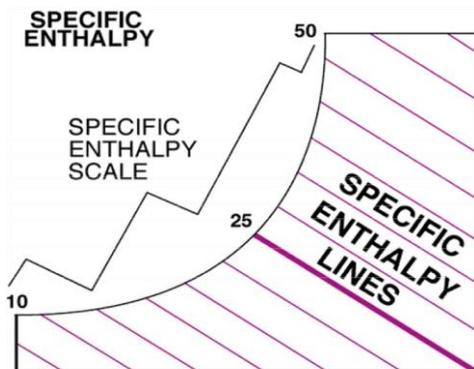
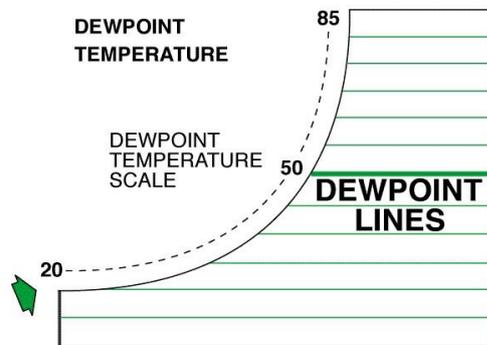
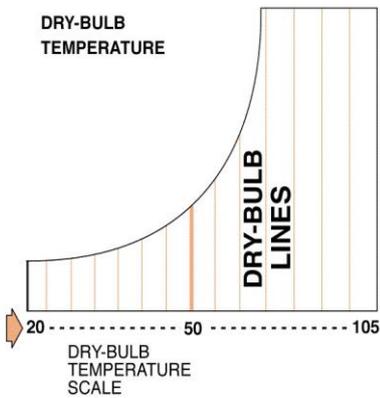
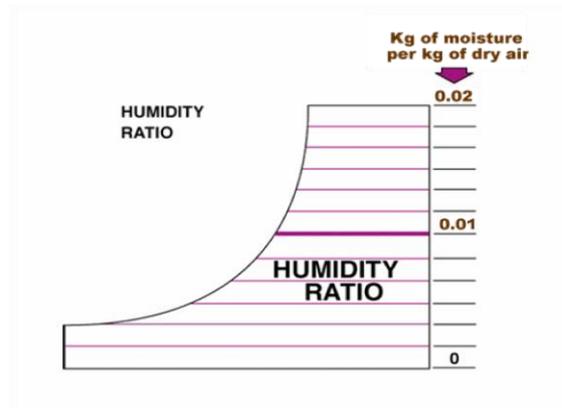
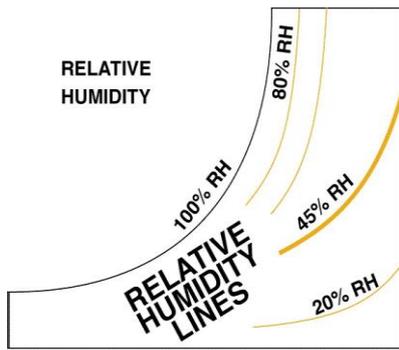
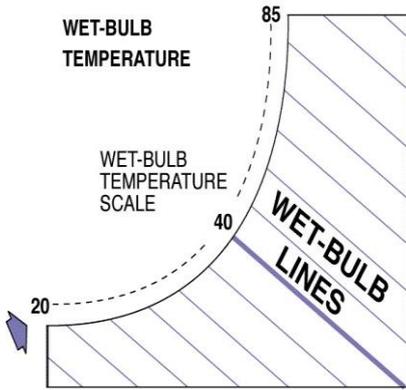
$$P_{total} = P_1 + P_2 + P_3 + \dots + P_n$$

Where,

- P_{total} is the total pressure exerted by the mixture of gases
- P_1, P_2, \dots, P_n are the partial pressures of the gases 1, 2, ..., 'n' in the mixture of 'n' gases

PSYCHROMETRIC PROCESSES



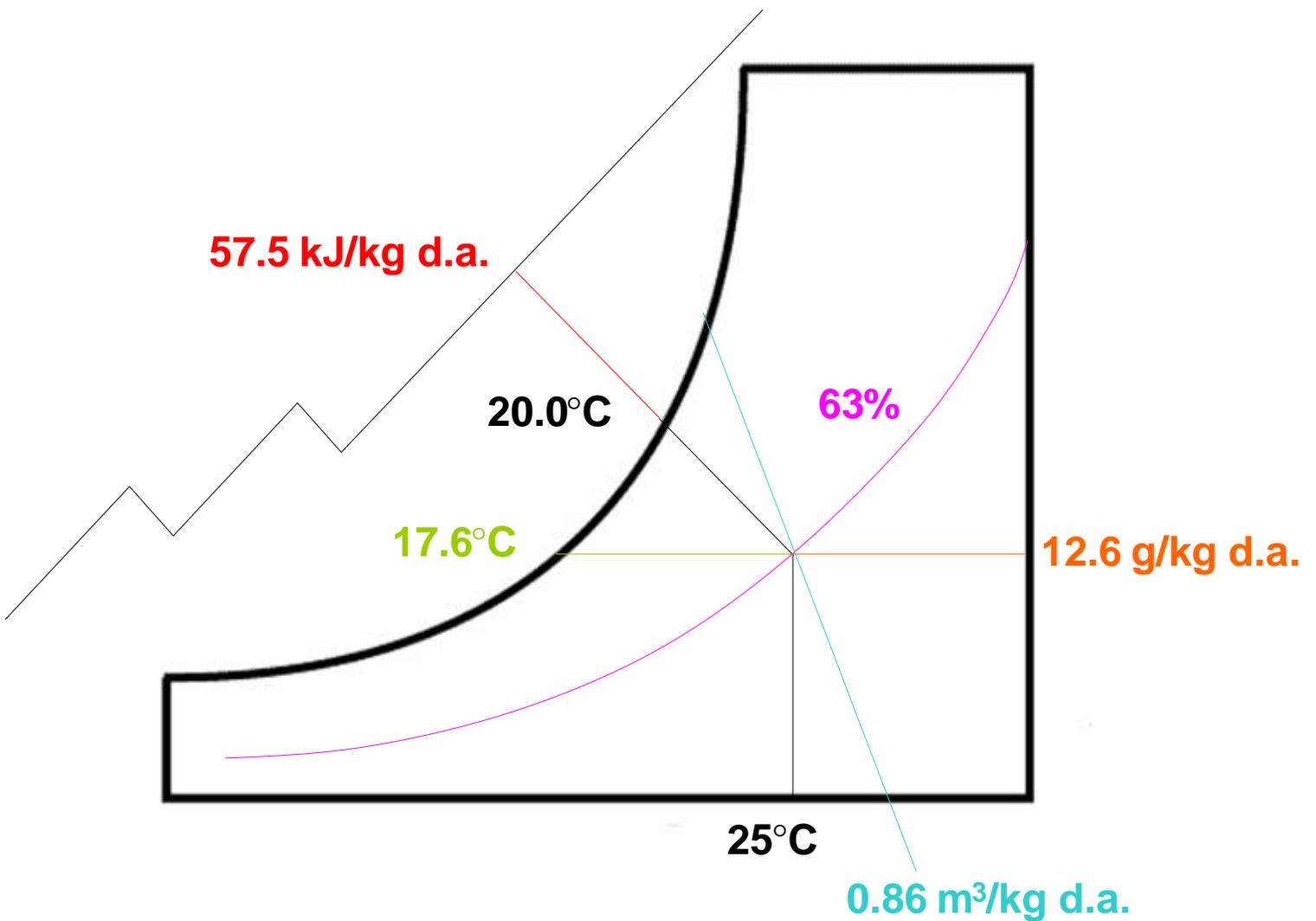


Psychrometric chart: Example

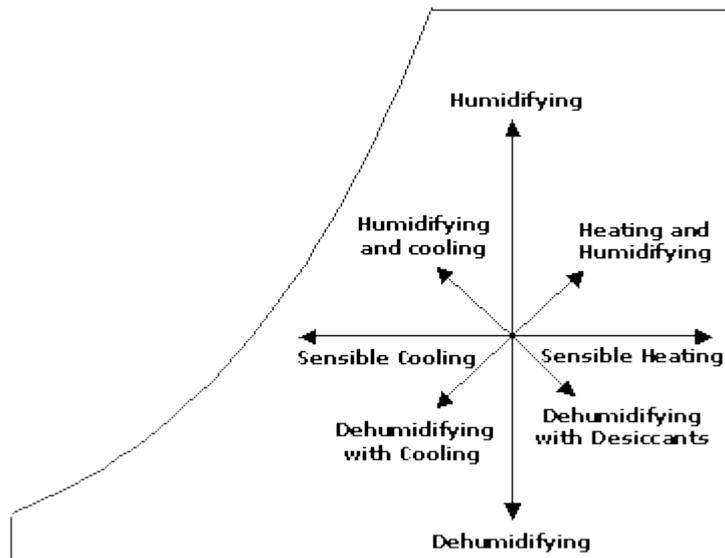
Given room temperature (DBT) = 25° C

Wet bulb temp. = 20° C

Find Relative humidity(RH),Dew point temp.(DPT),Humidity Ratio, Specific volume and Enthalpy.



PSYCHROMETRIC PROCESSES



Sensible Heating or Cooling A psychrometric process that involves the increase or decrease in the temperature of air without changing its humidity ratio. For example: passing moist air over a room space heater and of kiln air over the heating coils.

Humidification and Dehumidification The addition of moisture to the air, without change in its dry bulb temperature, is known as humidification. Similarly, removal of moisture from the air, without change in its dry bulb temperature, is known as dehumidification.

Cooling and Dehumidification This process is generally used in summer air conditioning to cool and dehumidify the air. The air is passed over a cooling coil or through a cold water spray. In this process, the dry bulb temperature as well as the specific humidity of air decreases. The final relative humidity of the air is generally higher than that of the entering air.

Heating and Humidification This process is generally used in winter air conditioning to warm and humidify the air. It is the reverse process of cooling and -- dehumidification. When

air is passed through a humidifier having spray water temperature higher than the dry bulb temperature of the entering air, the unsaturated air will reach the condition of saturation and thus the air becomes hot. The heat of vaporization of water is absorbed from the spray water itself and hence it gets cooled. In this way, the air becomes heated and humidified.

Adiabatic or Evaporative Cooling: A psychrometric process that involves the cooling of air without heat loss or gain. Sensible heat lost by the air is converted to latent heat in the added water vapour.