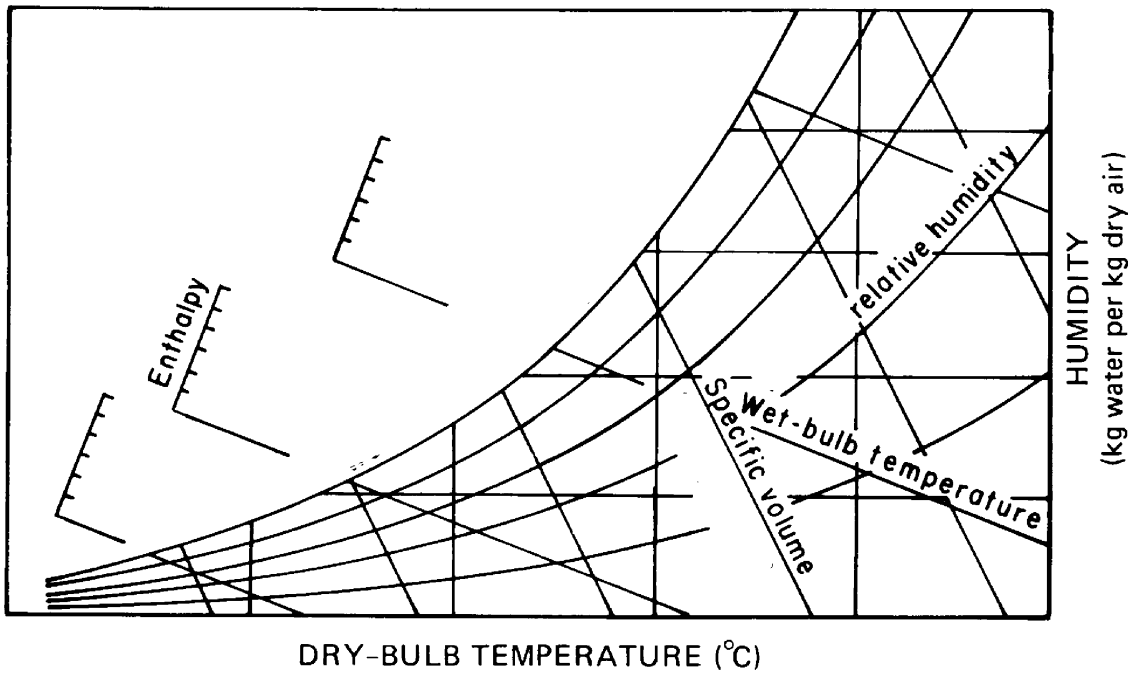
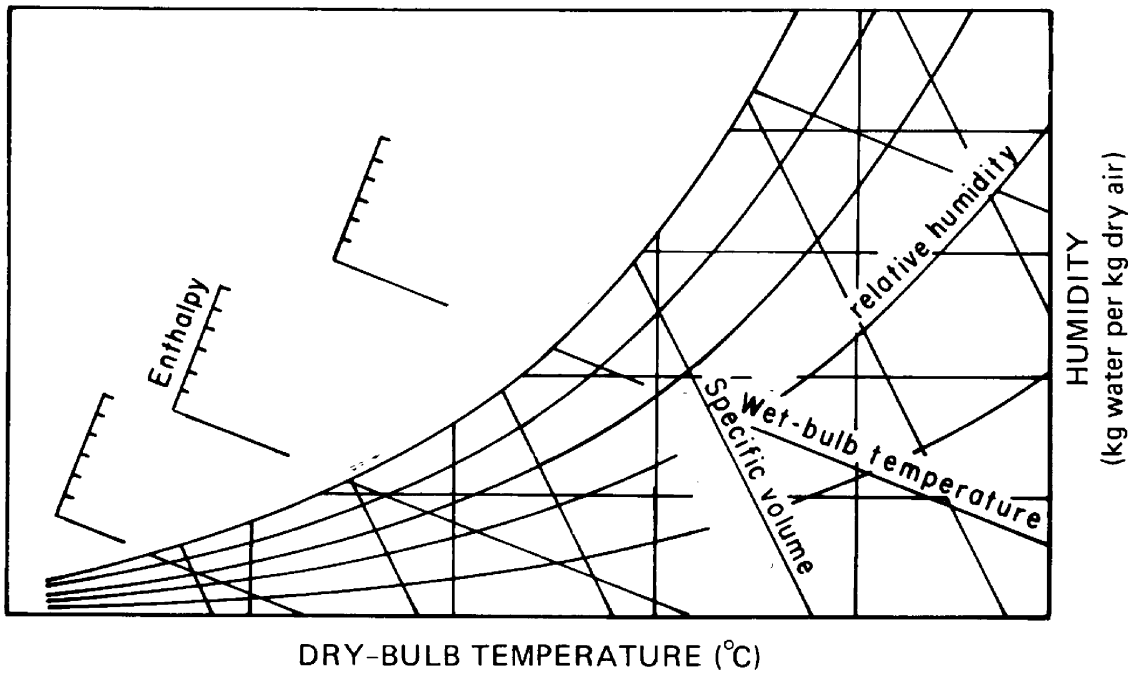
Use of psychrometric chart to follow changes in the properties of air-water vapor mixtures going through various processes

a) Heating (or cooling) of air :



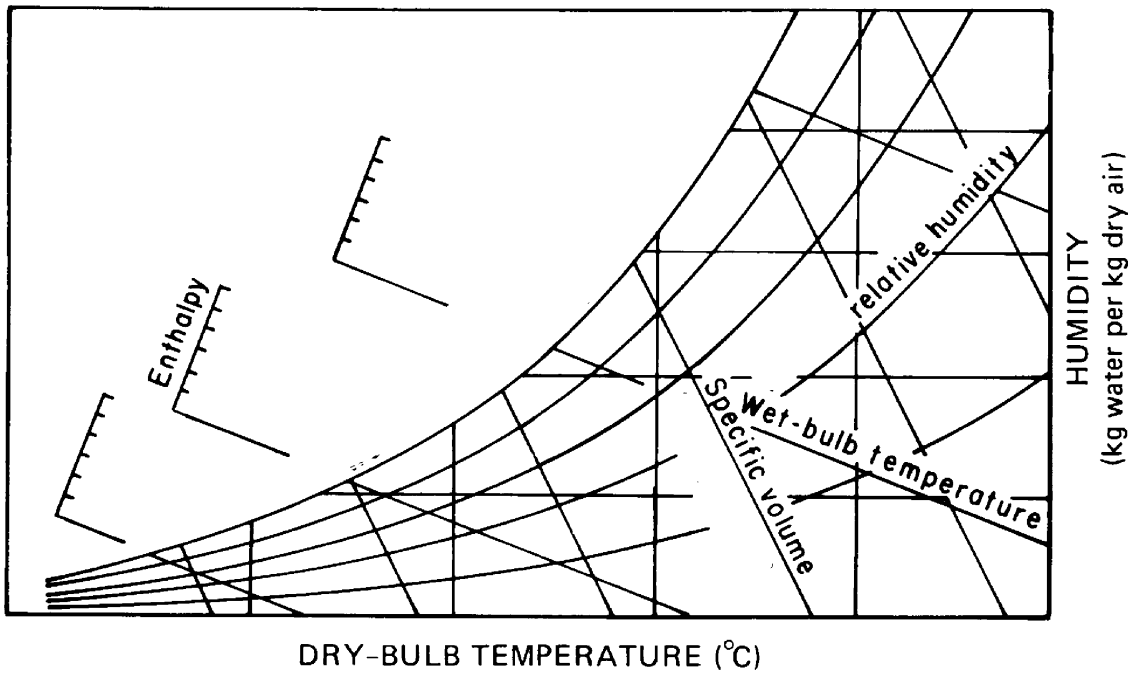
Example : Determine the rate of thermal energy required to heat $10 m^3$ / s of outside air at 30°C dry bulb temperature and 80% relative humidity to a dry bulb temperature of 80°C.

b) Mixing of air streams :



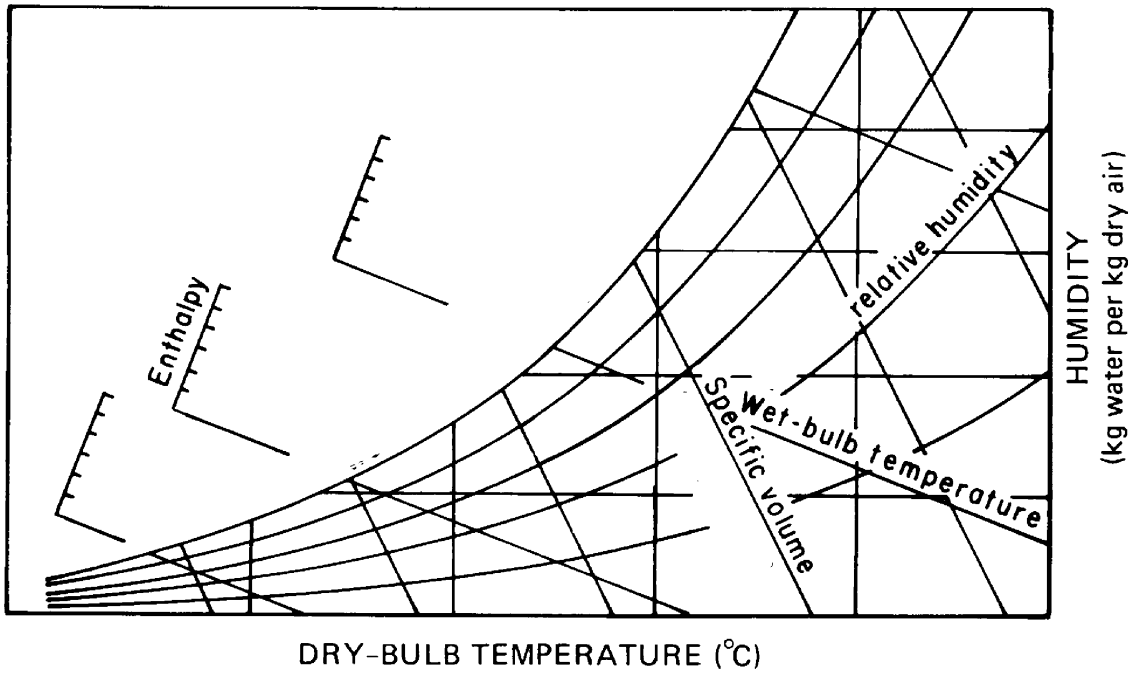
Example : In efforts to conserve energy, a food dryer is being modified to reuse part of the exhaust air along with ambient air. The exhaust airflow of $10m^3$ /s at 70°C and 30% relative humidity is mixed with $20m^3$ /s of ambient air at 30°C and 60% relative humidity. Using the psychrometric chart determine the dry bulb temperature and humidity of the mixed air.

c) Drying :



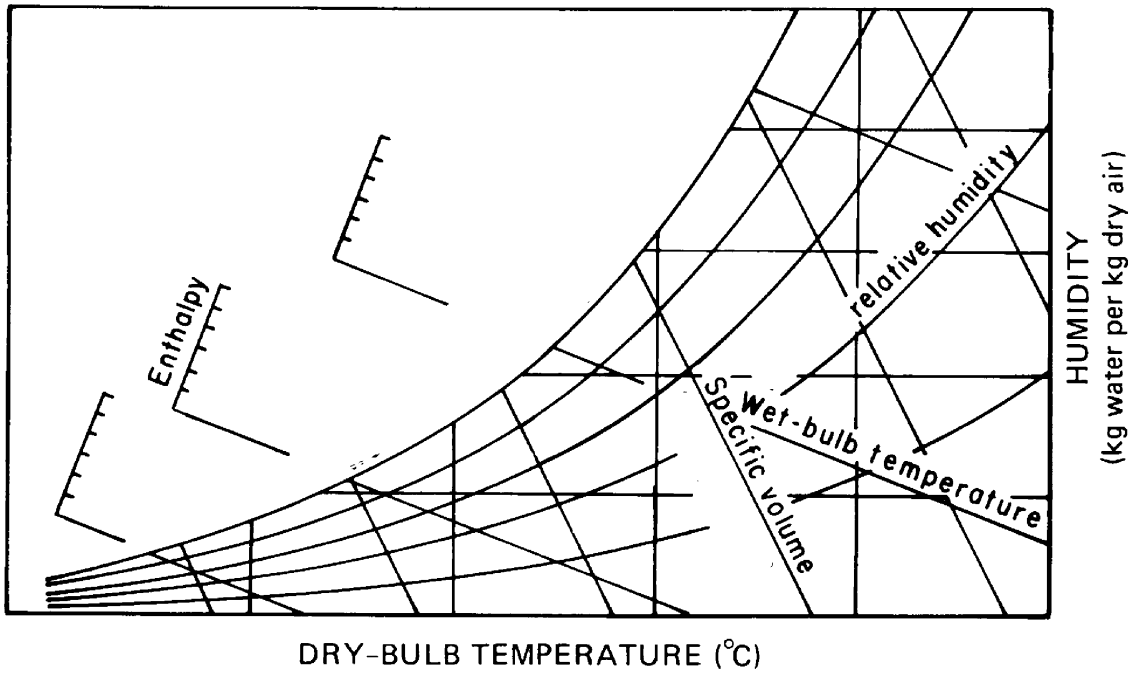
Example : Heated air at 50°C and 10% relative humidity is used to dry rice in a bin dryer. The air exits the bin under saturated conditions. Determine the amount of water removed per kg of dry air.

d) Heating and humidifying :



Example : Heating and humidifying of ventilating air occur as air moves through livestock buildings. Animals produce heat, vapor, and water; so both heat and water vapor are added to the air. Moist air enters a farrowing building through a baffled inlet at 1°C dry bulb temperature and 60% relative humidity, replacing air removed from the space by an exhaust fan. Air leaves the building at 1.3 m^3 / s, 20°C dry bulb temperature, and 65% relative humidity. Calculate the amount of heat and moisture added to the air by the livestock per kg of dry air.

e) Humidification:



f) Dehumidification: