

ME 161

Introduction to Mechanical Engineering

Lec Note 4: Brig Gen Humayun

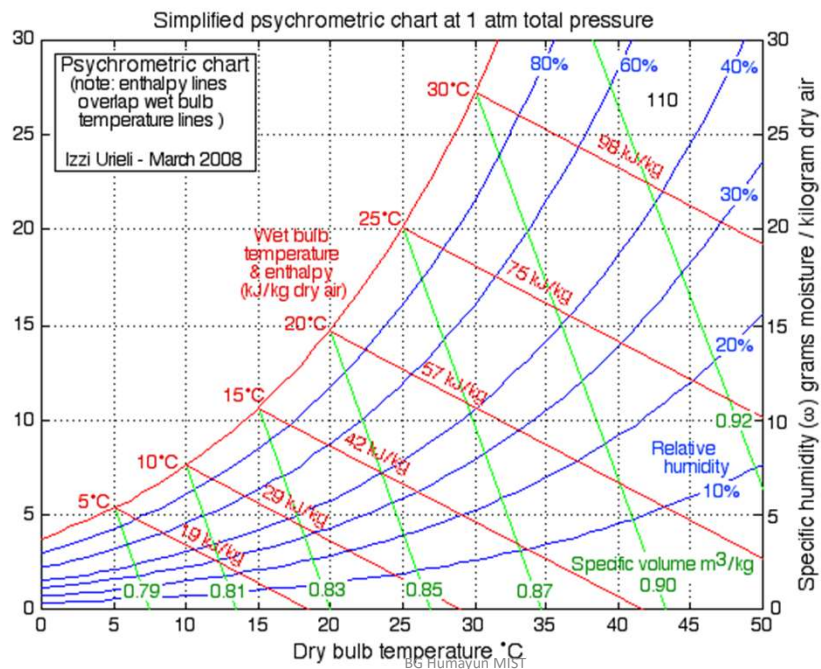
Refrigeration and air-conditioning

Please go through class notes and reference materials discussed in the class. This is just a guideline for those who missed the classes

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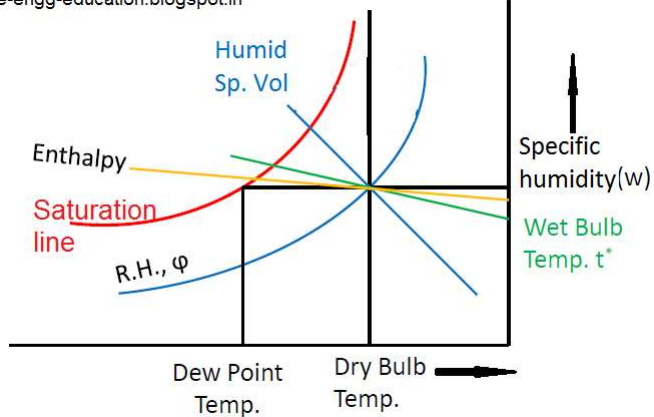


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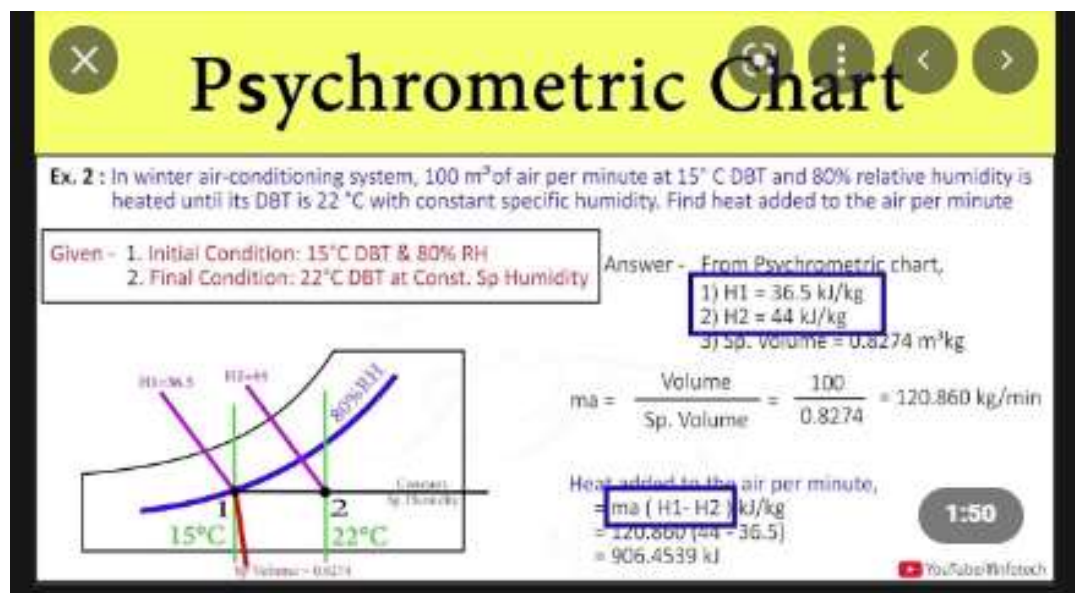
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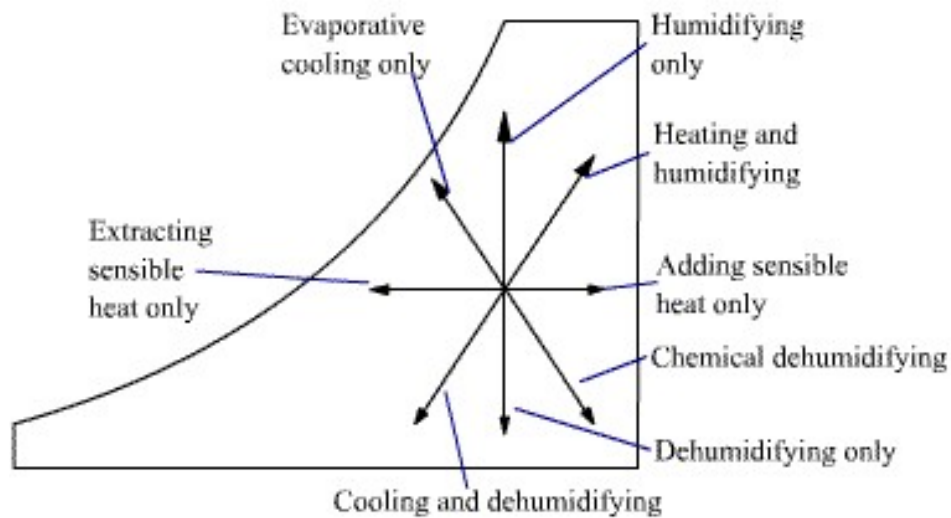
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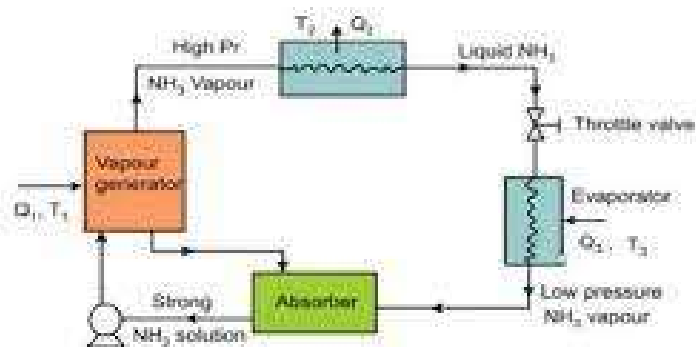


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Simple vapour absorption system

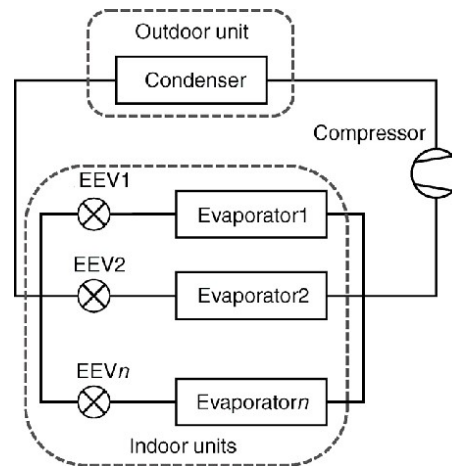


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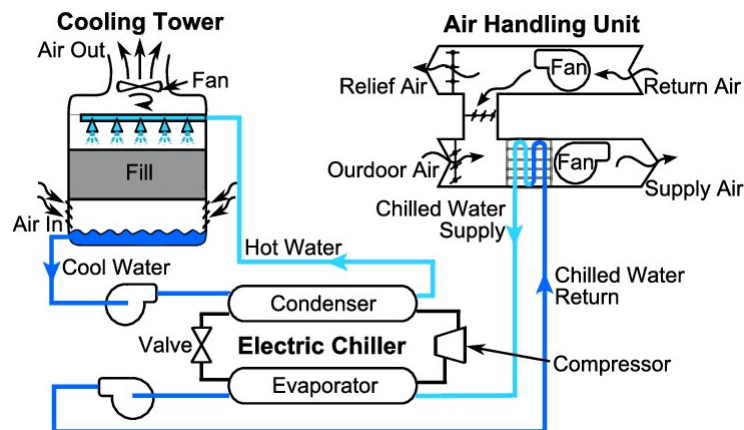
VRF Air-conditioning System



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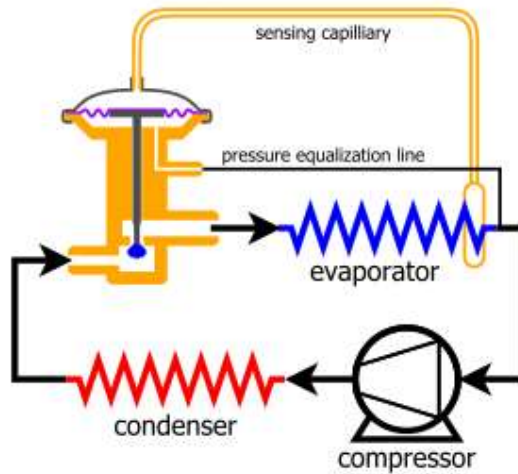


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How does expansion valve work in refrigeration system



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Properties of a good refrigerant

Desirable Properties of a Good Refrigerant

1) Thermodynamic Properties :-

- a) Boiling Point :- It should have Low Boiling Point.
- b) Freezing Point :- It should be below the Evaporator temperature.
- c) Evaporative Pressure :- It should be above Atmospheric pressure.
- d) Condensing Pressure :- It should have LOW Condensing pressure.
- e) Latent Heat of Vapourisation :- It should have HIGH Latent heat of Vaporisation.
- f) Critical Temperature & Pressure :- It should be above the condensing Temperature & Pressure.

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2) Chemical Properties :-

- a) Toxicity :- It should not be Poisonous or injurious . It should not be non-irritating to eyes.
- b) Corrosiveness :- It should not be corrosive & should not have any effect on materials used in equipment.
- c) Leak Detection :- It should have less tendency to leak & if it is leaking it should be easily detectable.
- d) Flammability :- It should not be Inflammable.
- e) Miscibility with Oil :- It should be immiscible with oil & should not have any effect on the properties of Oil used for Lubrication.
- f) Effect on Foodstuff :- It should not affect on food articles Or make them poisonous or unportable.

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3) Physical Properties :-

- a) Specific Volume :- It should be LOW in Vapour state.
- b) Viscosity :- It should have LOW viscosity.
- c) Thermal Conductivity :- It should have HIGH Thermal Conductivity.
- d) Di-Electric Strength :- It should have High strength.

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Terminology

Refrigerator- machine used to extract heat from body at low temperature to high temperature.

Refrigerant- It is liquid capable of absorbing heat from the other substance.

Capacity of Refrigerator- It is the rate at which heat can be removed from the cold body. Unit- ton of refrigeration

One ton of refrigeration is defined as the quantity of heat required to freeze one ton of water at 0°C in 24 hours. Value is 3.5 kJ/sec.

Coefficient of Performance- Ratio of heat absorbed to the workdone.
COP- Heat absorbed/ Work done

Refrigerant effect- Ratio between heat removed and the time taken. Heat removed/ time taken.