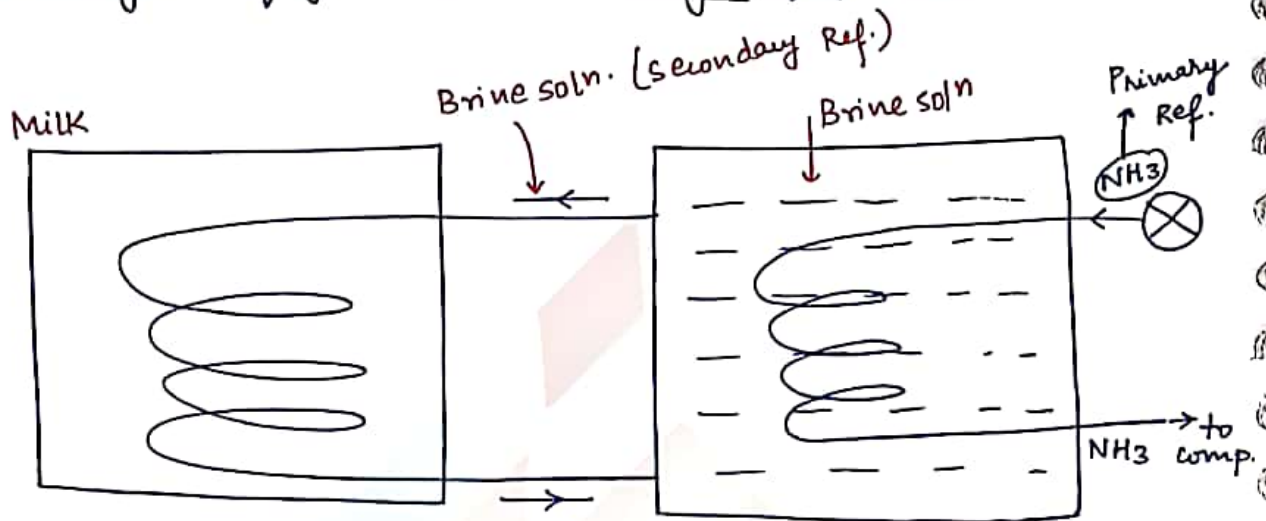


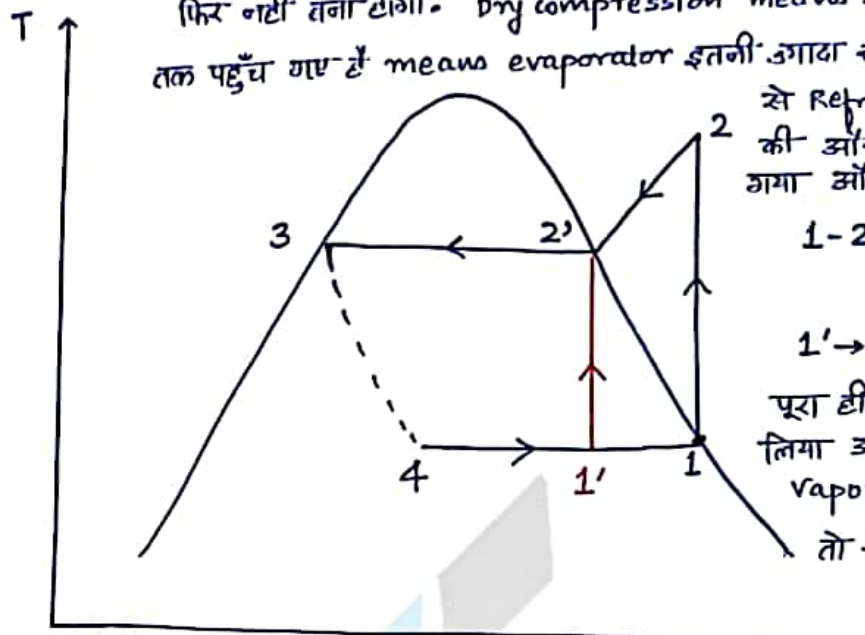
Primary Refrigerant & Secondary Refrigerant :-



- ① The Refrigerant which circulates through Refrigeration equipments is called primary refrigerant.
- ② The Refrigerant which absorbs heat from the Refrigerated space and inturn rejects it to primary refrigerant is called secondary Refrigerant.
- ③ Secondary refrigerant used in milk chilling plants is Brine solution. In all ^(A/C) conditioning applications, air is the secondary refrigerant.
- ④ Secondary Refrigerant helps in :-
 - (i) Saving the cost associative with amount of primary refrigerant.
 - (ii) Saving the operational cost as refrigerant with good Thermodynant

DRY COMPRESSION v/s WET COMPRESSION:-

evaporator के end में जो तरह की चीज possible हैं गो तो Refrigerant gas तन गमा देगा गो फिर नहीं बना देगा. Dry compression means हम saturated vapour तक पहुँच गए हैं means evaporator इतनी जगह रही हैं कि किसी space से Refrigerant ने heat absorb की और Phase change करा गया और end में उसने अपना



1-2 dry compression

1'→2' wet ,,

पूरा ही Phase change कर लिया और वो liquid से 100% vapour में convert हो गया

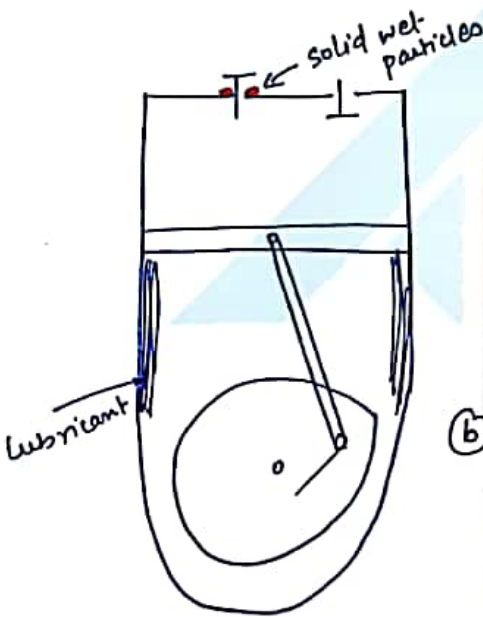
तो that is dry compression

complete vapour of liquid refrigerant

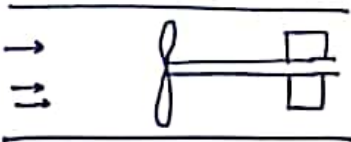
(a) In wet compression, the But (*)

Refrigeration effect is less when compared to dry compression because incomplete vapourisation of refrigerant takes place.

(b) work input in wet compression is less because the specific volume handled is less



(c) Wet compression is preferred only in Rotary compressors but in Reciprocating compress. even though it



generally gives a higher COP because:-

(1) Liquid particles (Refrigerant) may wash away the lubricating oil resulting in wear and tear of compressor. (*)

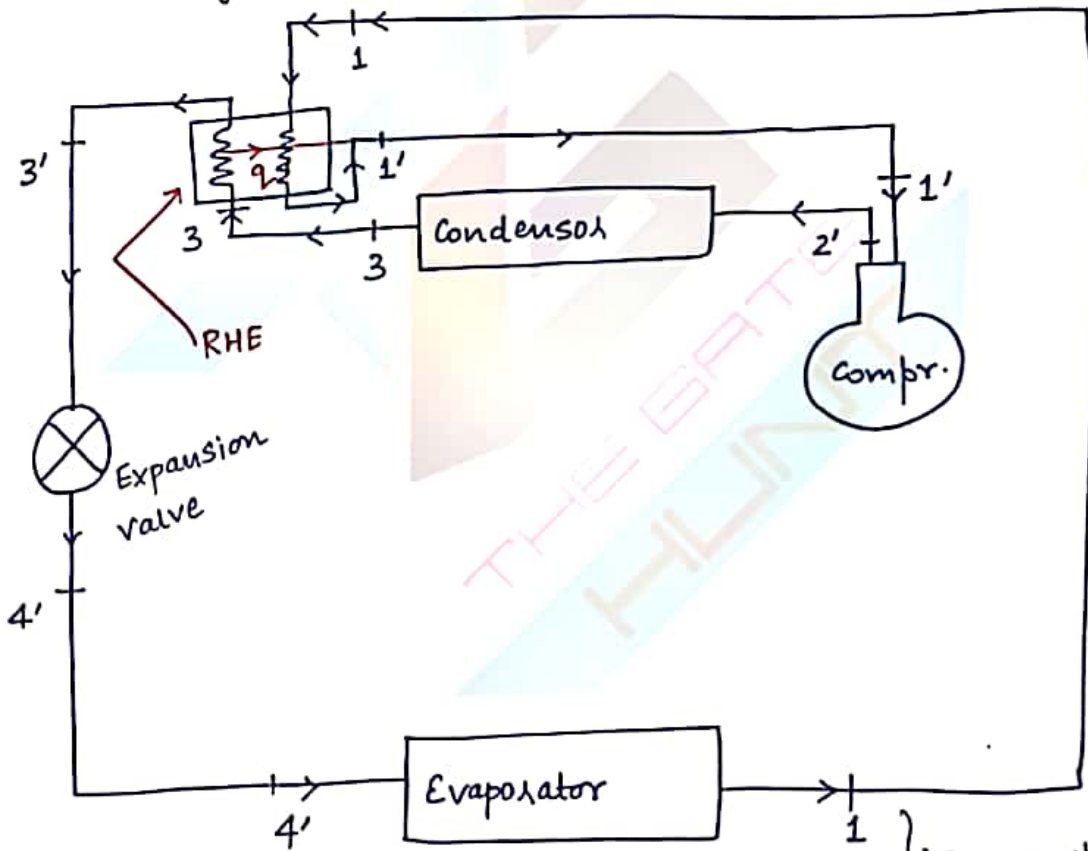
(2) liquid particles interfere in the opening and closing of walls hence/damaging the sealing of walls.

Regenerative Heat Exchanger :-

Liquid Line Heat Exchanger

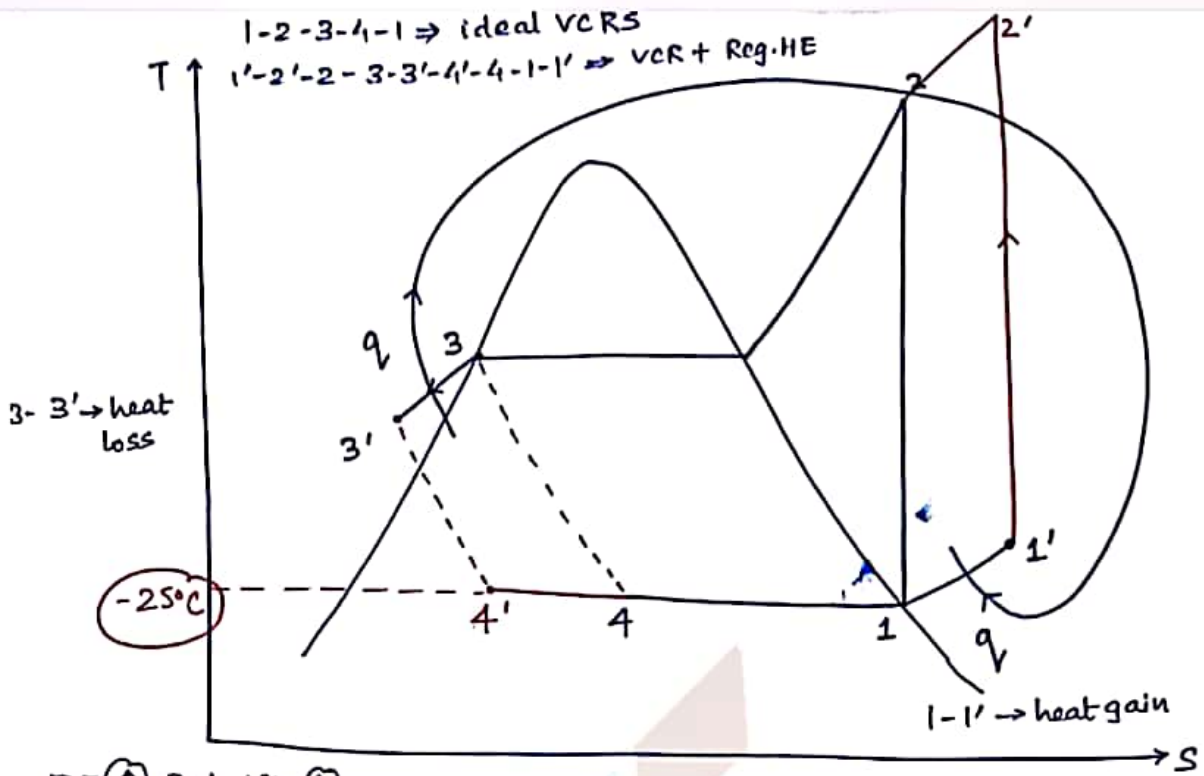
→ Condenser से निकलने वाले Refri. को और ठंडा करना।
Subcooling Heat Exchanger in Vapour Compression Cycle :-

→ limitation → ambient



Subcooling + Superheating
 (3 का Temp ↓) (1 और 4 का vapour Temp ↑)

Refrigerant कम Temp. का HE में और heat लेता Before entering to compressor



RE \uparrow But Win \uparrow

$$R.E. = h_1 - h_{4'} = (h_1 - h_4) + (h_4 - h_{4'}) \rightarrow x(\text{let})$$

$$COP_{I/P} = h_{2'} - h_{1'}$$

$$\rightarrow \underline{q_{\text{lost}} = q_{\text{gained}}}$$

$$h_3 - h_{3'} = h_{1'} - h_1$$

$$C_{P_{\text{liq}}}(T_3 - T_{3'}) = C_{P_{\text{vap}}}(T_{1'} - T_1) \rightarrow \text{D.O. Superheating}$$

\downarrow
 vapour

\downarrow
 D.O. Subcooling

• The heat lost is equal to the heat gain but degree of subcooling is not equal to degree of superheating because specific heat of liquid and vapour is different.

Working :- NH_3 vapour enters the absorber where it dissolves in water. The reaction is exothermic and lot of heat is generated. Solubility of NH_3 is inversely proportional to the temperature of the solution. Cooling water is circulated continuously to maintain low temp. in absorber. The solution rich in NH_3 is pumped to the generator while passing through the regenerative heat Exchanger (R.H.E.). After absorbing some heat in regenerative heat exchanger, the solution enters generator.

In Generator, as the heat is supplied to the solution, ammonia separates creating high pressure NH_3 vapours. The NH_3 vapour is analysed passed through analyser where H_2O condenses. NH_3 vapours are further passed through the rectifier for the complete removal of water vapour.

water vapour presence is undesirable as it may condense freeze at the exit of the throttling valve because of low temperatures, hence choking the system.

Important points :- ① VAS works on low grade energy (heat), hence the COP is low (0.3 to 0.5). VC system works on high grade energy (work).

② Most popular VAS is ammonia water system., here NH_3 is the refrigerant and water is absorbent. ~~other VAS system are~~

③ other VAS system $\rightarrow \text{Li-Br} - \text{H}_2\text{O}$ and $\text{Li-Cl} - \text{H}_2\text{O}$. In these two system, water is the refrigerant and LiBr and LiCl are absorbent. But these systems can be used only for Air conditioning (A/C) purposes.

③ VAS is used where large waste heat is available or the cost of electricity is very high. solar refrigeration system and Geothermal refrigeration system are based on VAS.

④ Heat is absorbed in generator and evaporation whereas it is rejected in condenser and absorber.