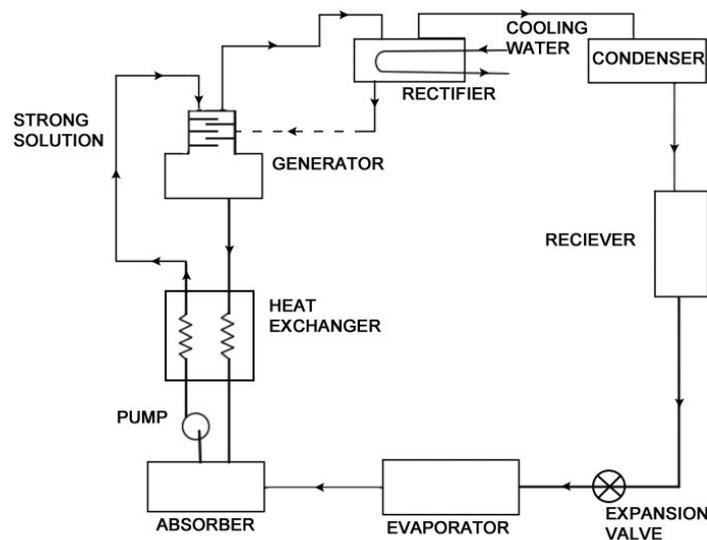


Vapour absorption refrigeration system

The absorption refrigeration system uses heat energy instead of mechanical energy to change the condition required in the refrigeration cycle. The heat energy required may be obtained from a gas flame, an electrical heater, or a kerosene flame. The principal advantages in the absorption refrigeration system lies in the fact that, since no moving parts are involved, the repairs and maintenance cost will be minimum. The comparison between the functioning of an absorption system and a compression system of refrigeration is principally as follows: The absorption system uses heat (usually a gas flame) to circulate the refrigerant, while the compression system employs a compressor to circulate the refrigerant, while the components of the absorption system, which compare with the components of the vapour compression refrigeration system is as follows:

- The boiler or generator compares with the stroke of the compressor.
- The condenser and evaporator serve the same purpose in an absorption system as that in the vapour compression refrigeration.
- The absorber compare to the low side of the system.

2.8.The function of an absorption refrigeration system



Absorption refrigeration system

In a simple absorption refrigeration, the low pressure refrigerant vapour (ammonia) coming from the evaporator is absorbed in the absorber by the weak solution of refrigerant in water. Absorption of ammonia lowers the pressure in the absorber, which in turn draws more ammonia vapour from the evaporator; water cooling system is engaged in the absorber to remove the heat of solution. The solution in the absorber is called a strong solution because it is rich in refrigerant. The strong solution from the absorber is pumped to the generator, which is at a higher pressure. Heat is added to the generator from the heating source, which may be a gas burner or steam.

As a result of heating, ammonia gas gets expelled from the strong solution in the generator and passes onto the condenser, where it is again condensed to liquid and passed on to receiver. The weak solution in the generator after ammonia is expelled pass through the reducing valve to the absorber.

Ammonia and water combination is commonly used in (domestic refrigeration) absorption

due to the following reasons.

- Water has the ability to absorb ammonia in large quantity.
- Ammonia and water have different boiling points.
- Ammonia has high latent heat value.
- Ammonia and water are easily available.

Some times absorption refrigeration machine does not give proper cooling effect because of the following causes.

- Generator is not being heated properly
- Condenser is not being cooled properly
- Absorber is not being cooled properly
- Cabinet is overloaded
- Door leakage of the cabinet

$$\text{C.O.P of absorption refrigeration system} = \frac{\text{Heat absorbed in evaporator}}{\text{Work done by pump} + \text{Heat supplied in generator}}$$

2.9. Difference between vapour compression system and vapour absorption system

Vapour compression system	Vapour absorption system
The system has a main parts like Compressor, condenser receiver, refrigerant control device and evaporator	The system has a main parts like generator, rectifier, condenser absorber and evaporator
The system is noisy in operation	The system is quiet in operation
The system has so many moving parts, so there is a possibility of wear and tear	The system has no moving parts and no possibility of wear and tear or sticking.
Energy supplied is mechanical	Energy input is mainly heat
Generally steel, copper tube is used to connect the parts	Steel tube is used to connect the parts
To reduce the high pressure control devices like expansion valve, front valve, capacity tube are used	To reduce the pressure hydrogen gas is provided
The flow of gas depends upon the compressor	The flow of gas depends upon the gravity and working of the generator
This system is required to operate by prime movers like electric motor, diesel or petrol engine	This system is required to operate by heat energy like gas kerosene or electric heater.
This system is more efficient and occupies more space	This system is poor efficient
Charging of refrigerant is quite simple	Charging of refrigerant to the system is difficult
Energy supply is low	Energy supply is high