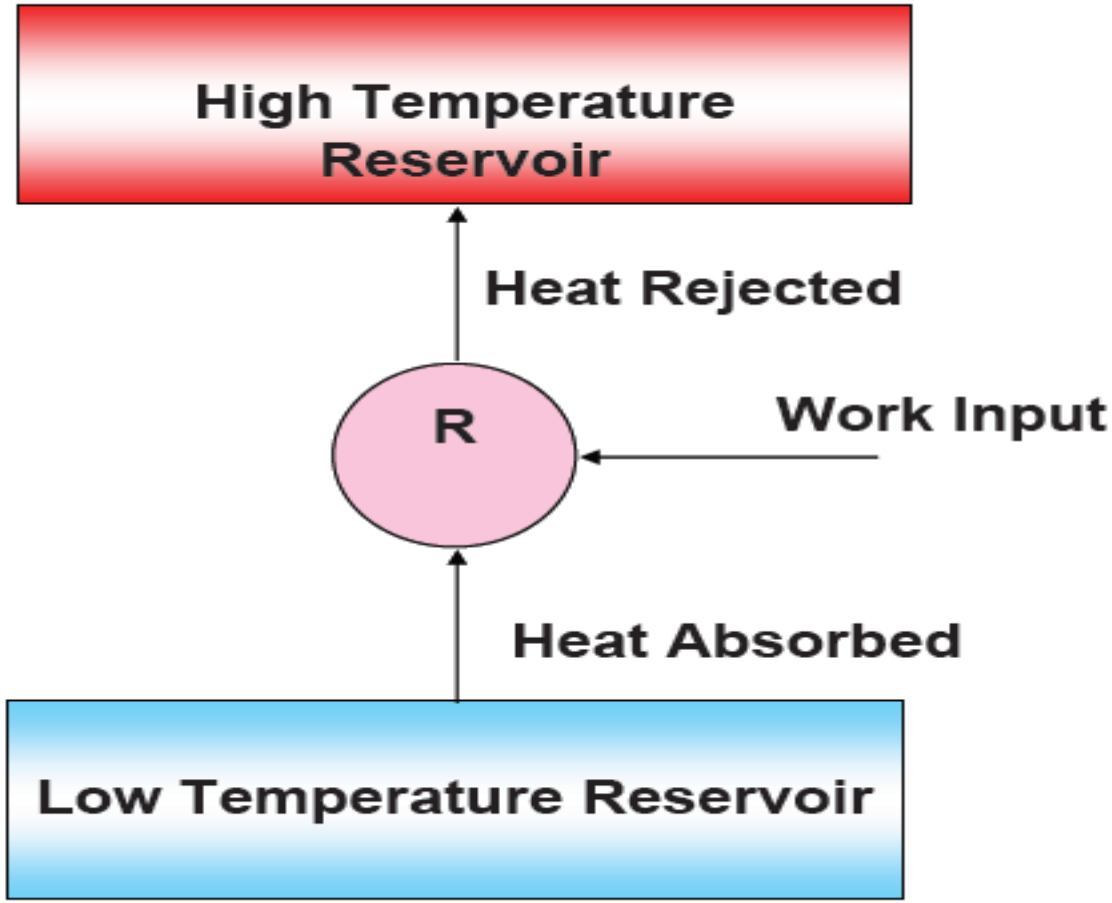
VAPOUR COMPRESSION REFRIGERATION SYSTEM

Working of a refrigerator



Introduction:

Refrigeration:

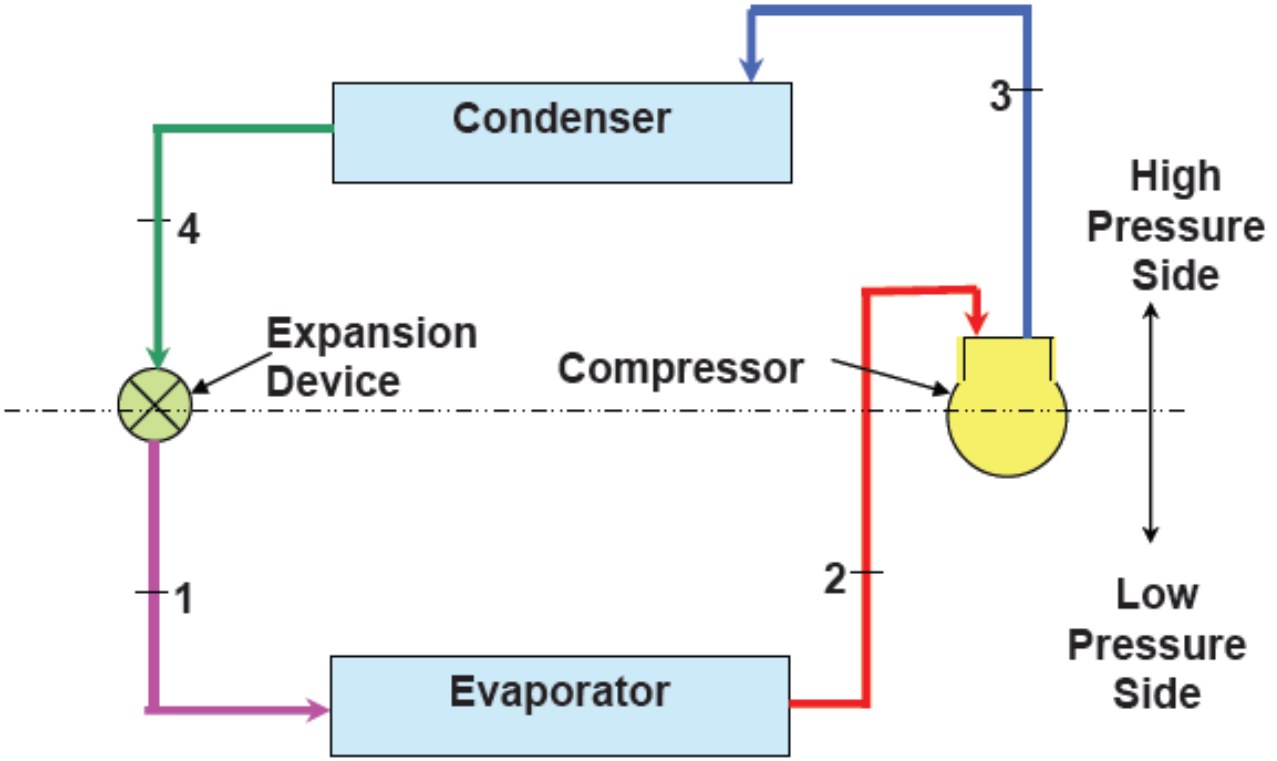
- Refrigeration is defined as the production of temperature lower than those of the surroundings and maintaining the lower temperature within the boundary of a given space.

Vapour compression refrigeration:

- Highly compressed fluids tend to get colder when allowed to expand.
- If pressure high enough
  - Compressed air hotter than source of cooling.
  - Expanded gas cooler than desired cold temperature.

Vapour Compression Refrigeration

Refrigeration cycle



Refrigerant:

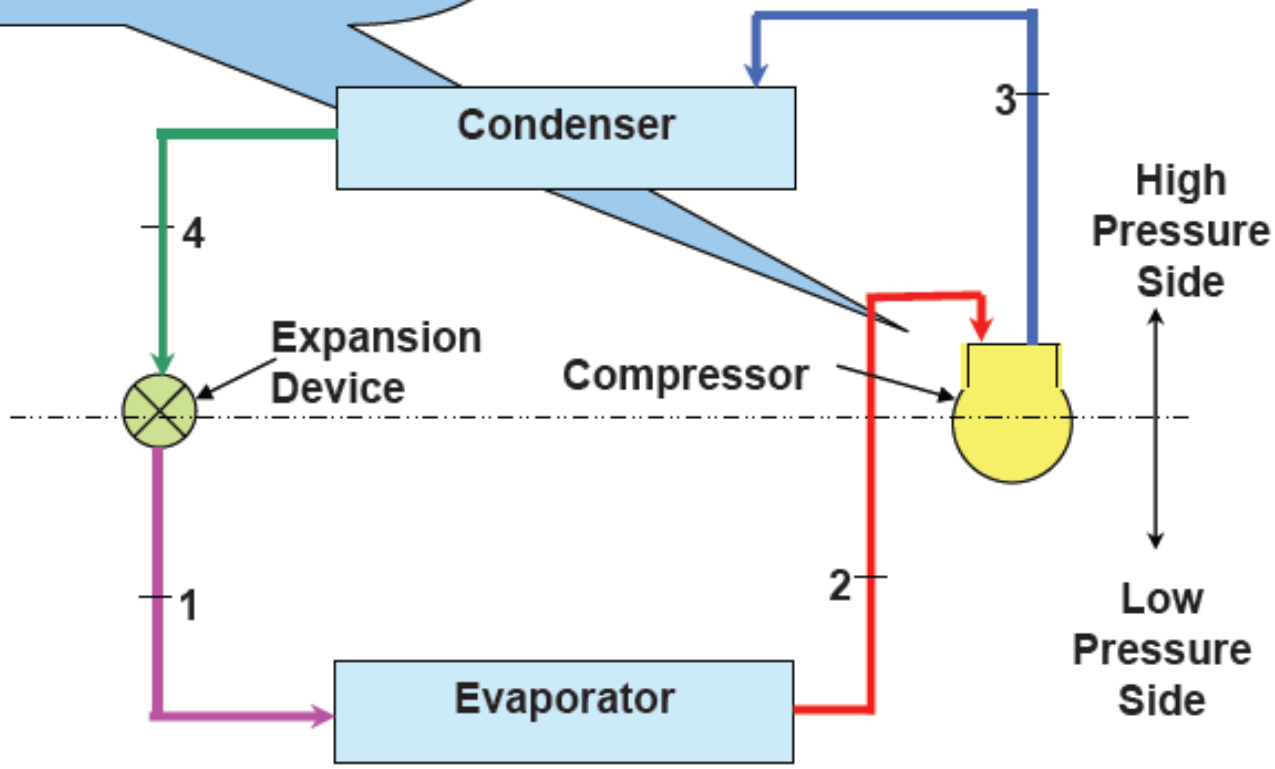
A refrigerant is a substance used in a heat cycle usually including, for enhanced efficiency, a reversible phase change from a gas to a liquid.

Types:

- Refrigerant determined by the required cooling temperature.
- Chlorinated fluorocarbons (CFCs) or freons: R-11, R-12, R-21, R-22 and R-502.

Refrigeration cycle:

The superheated vapour enters the compressor where its pressure is raised



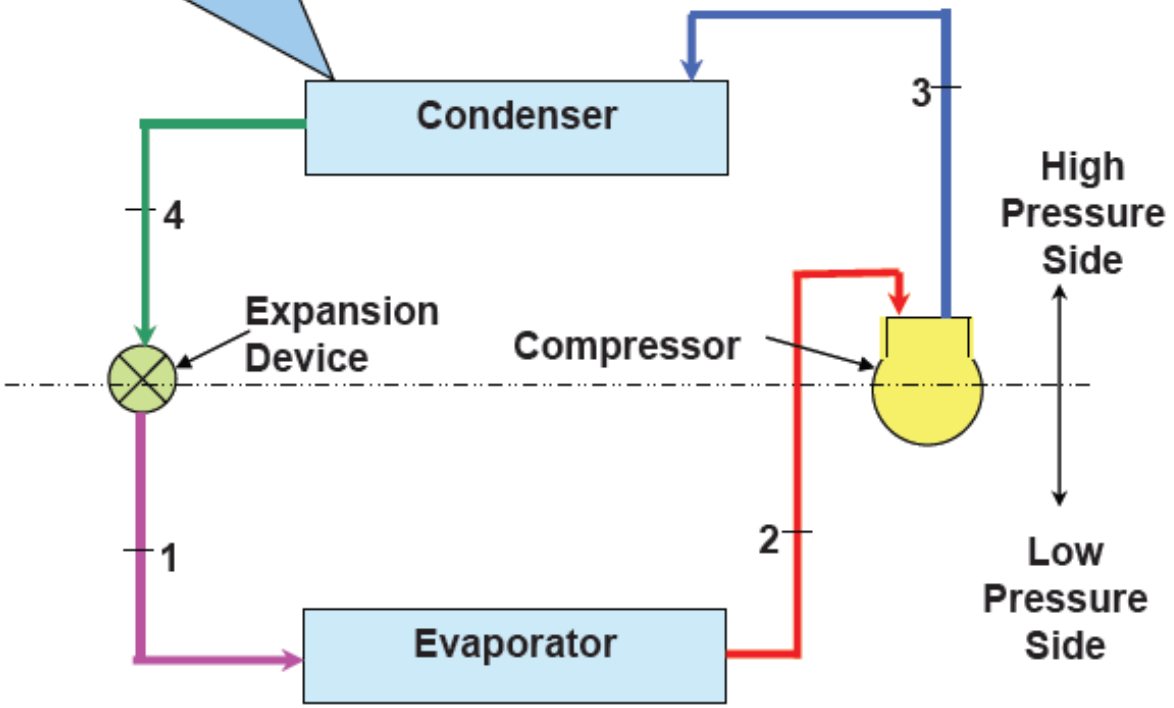
Compressor

Functions of Compressor:

- Compressor is the heart of vapour compression refrigeration system.
- A compressor is a mechanical device that increases the pressure of a gas by reducing its volume.
- Hermetically sealed compressor is used since leakage of refrigerant is totally prevented.
- More compact and requires small space.
- Less noisy.

Refrigeration cycle:

The high pressure superheated gas is cooled in several stages in the condenser



Condenser

Functions of condenser:

- The condenser removes and dissipates heat from the compressed vapor to the surrounding water to condense the refrigerant vapor to a liquid.
- Condenser are heat exchanger.
- Function of condenser is to get ride of heat absorbed previously and reliquefy the refrigerant.
- The vapour refrigerant condenses back to liquid at constant pressure.

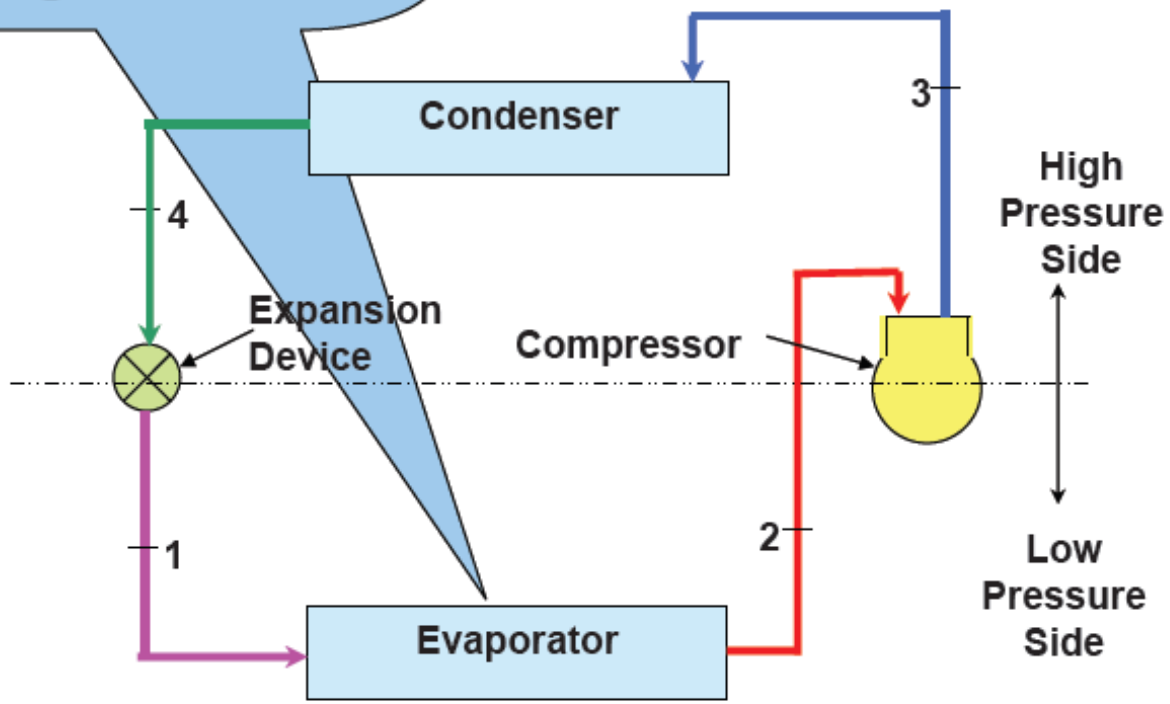
Capillary Tube:

Functions of Capillary tube:

- The capillary tube has the function of transporting the working liquid from the condenser to the evaporator.
- The small diameter and long length of the tube produces a large pressure drop It is a constant-restriction type expansion device .
- It controls the flow of refrigerant into evaporator.
- They are simple , inexpensive and have no moving parts.

Refrigeration cycle:

Low pressure liquid refrigerant in evaporator absorbs heat and changes to a gas



Evaporator:

Functions of Evaporator:

- Evaporator is a device in which the refrigerant is boiled by extracting heat from surrounding medium.
- It is the cooling unit, and some time called the cooling coil, freezing coil etc.
- The liquid refrigerant from expansion valve enters into evaporator coil at a temperature below the temperature of evaporator.
- It extracts heat from evaporator and produces coldness.

Advantages:

- Effective temperature reduction is achieved by using cooling tower
- Heat transfer rate remains high (temperature of working fluid much lower than what is being cooled)