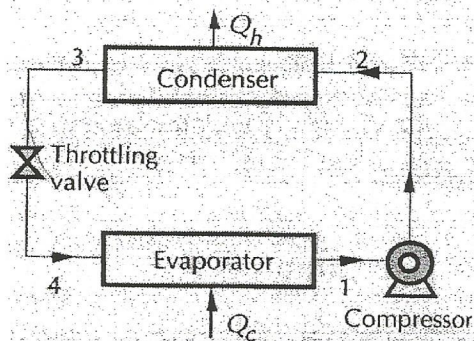


Example: An air conditioner that has both cooling and heating functions works as a refrigerator in summer and as a heat pump in winter.

THE VAPOUR COMPRESSION REFRIGERATION CYCLE

Most modern refrigerators work on the vapour compression cycle. The cycle consists of four elements:

- **Compressor:** Compresses the refrigerant
- **Condenser:** Condenses the refrigerant. (Fins behind the normal household fridge).
- **Receiver:** Stores liquid refrigerant from the condenser and supplies it to the throttle valve.
- **Throttling Valve:** Allows the liquid refrigerant under high temperature and pressure to pass at a controlled rate to the evaporator after reducing its pressure and temperature.
- **Evaporator:** Extracts heat from the substance to be cooled and passes it on to the refrigerant. This is the actual refrigerating compartment in a normal household refrigerator.



THE CYCLE

1. Vapour of a refrigerant is compressed from State 1 to a pressure whose saturation temperature is above the temperature of a hot reservoir – State 2.
2. It is then condensed completely to a liquid (State 3) and throttled to a lower pressure (State 4) so that the corresponding saturation temperature is lower than the temperature of the cold reservoir.
3. At the low pressure, the refrigerant enters the evaporator, where it evaporates and absorbs heat from the low temperature reservoir.
4. The vapour that emerges from the evaporator (State 1) enters the compressor thus completing the cycle.

PROPERTIES OF A GOOD REFRIGERANT

A good refrigerant should have:

- A high latent heat of vaporisation, h_{fg} .
- A vapour pressure above the atmospheric pressure at the lowest temperature of the cycle.
- Not a very high pressure in the condenser (a suitably low pressure in the condenser).
- Should be non-toxic, non-corrosive, and environmentally friendly.

Examples of refrigerants:

Amonia – This refrigerant is used in large refrigerator plants.

Chlorinated and Flourinated Hydrocarbons – known as Freons – for smaller units

It has been noticed that most Freons e.g. R – 12 used in household refrigerators and car air conditioners have drastic effects on the ozone layer. Efforts are being made to replace these with environmentally friendly refrigerants.

ACTIVITY

Describe the main components of a normal household refrigerator, the manner in which they are connected, their functions and materials used that they are made of.

Submit Written report
after break