

# Magnetic Refrigerator

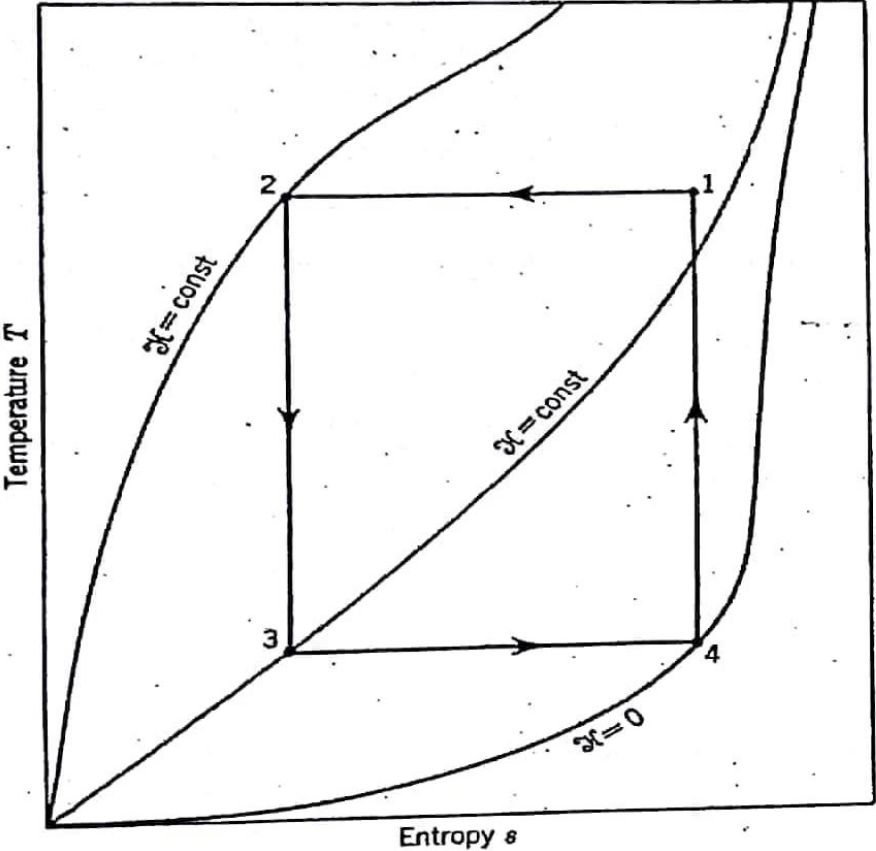
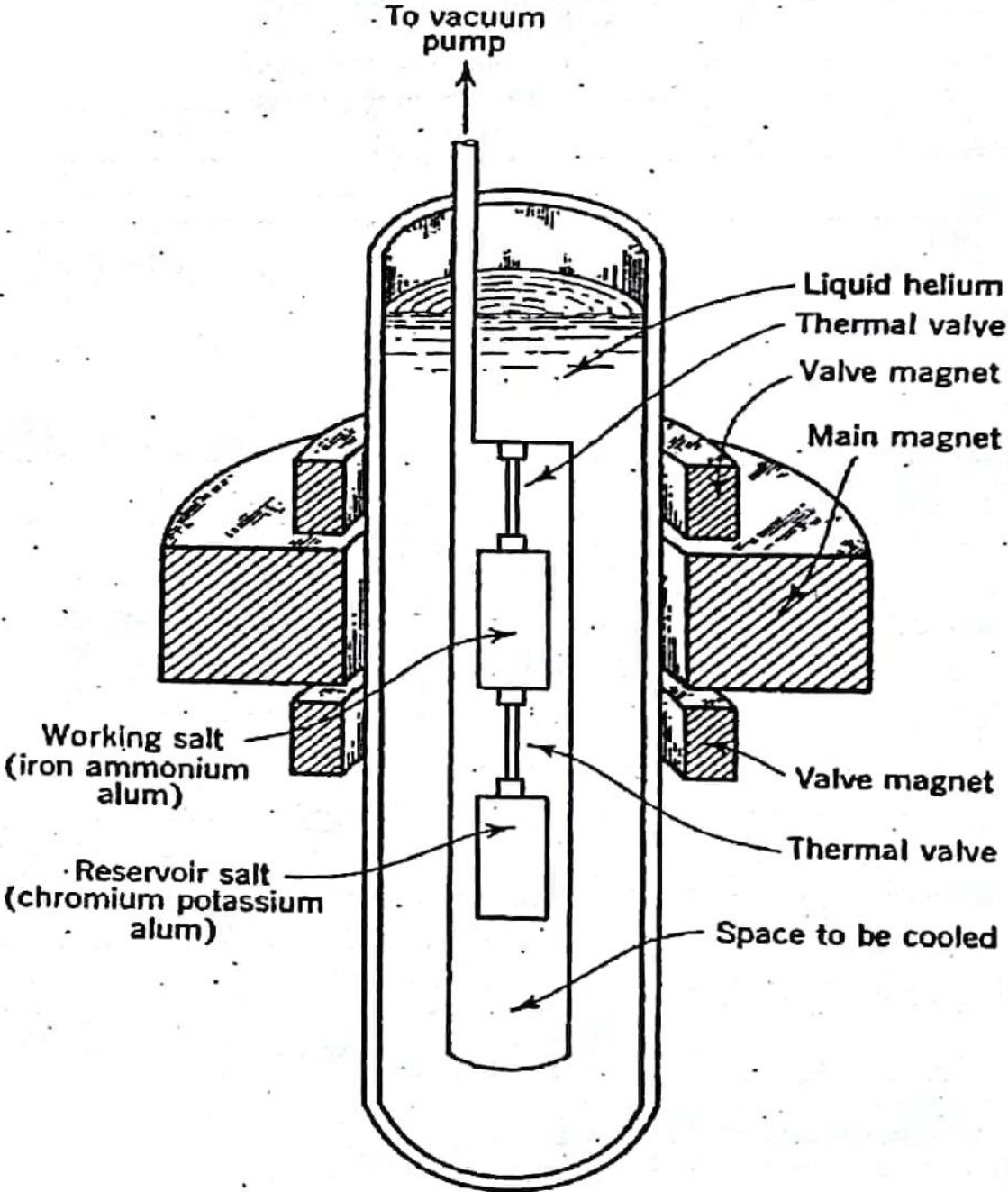


Fig. 5.27. Thermodynamic cycle for the magnetic refrigerator.



**1-2:** Magnetic field is applied

upper valve open

lower valve closed

heat absorbed from the *He*  
bath to maintain constant T

analogous to isothermal  
compression

**2-3:** Both valves closed

Magnetic field reduced  
adiabatically to an  
intermediate value

Temperature decreases

Analogous to adiabatic  
expansion

**3-4:** Lower valve is open

Magnetic field around  
working salt is reduced to  
zero

Heat is absorbed  
isothermally from the  
reservoir salt

Analogous to Isothermal  
expansion

**4-1:** Both valves closed

Magnetic field adiabatically  
increased to original value

Analogous to adiabatic  
compression

**CARNOT CYCLE – Carnot COP**

# Dilution Refrigerator

Fig. 5.32. Phase diagram for He<sup>3</sup>-He<sup>4</sup> mixtures.

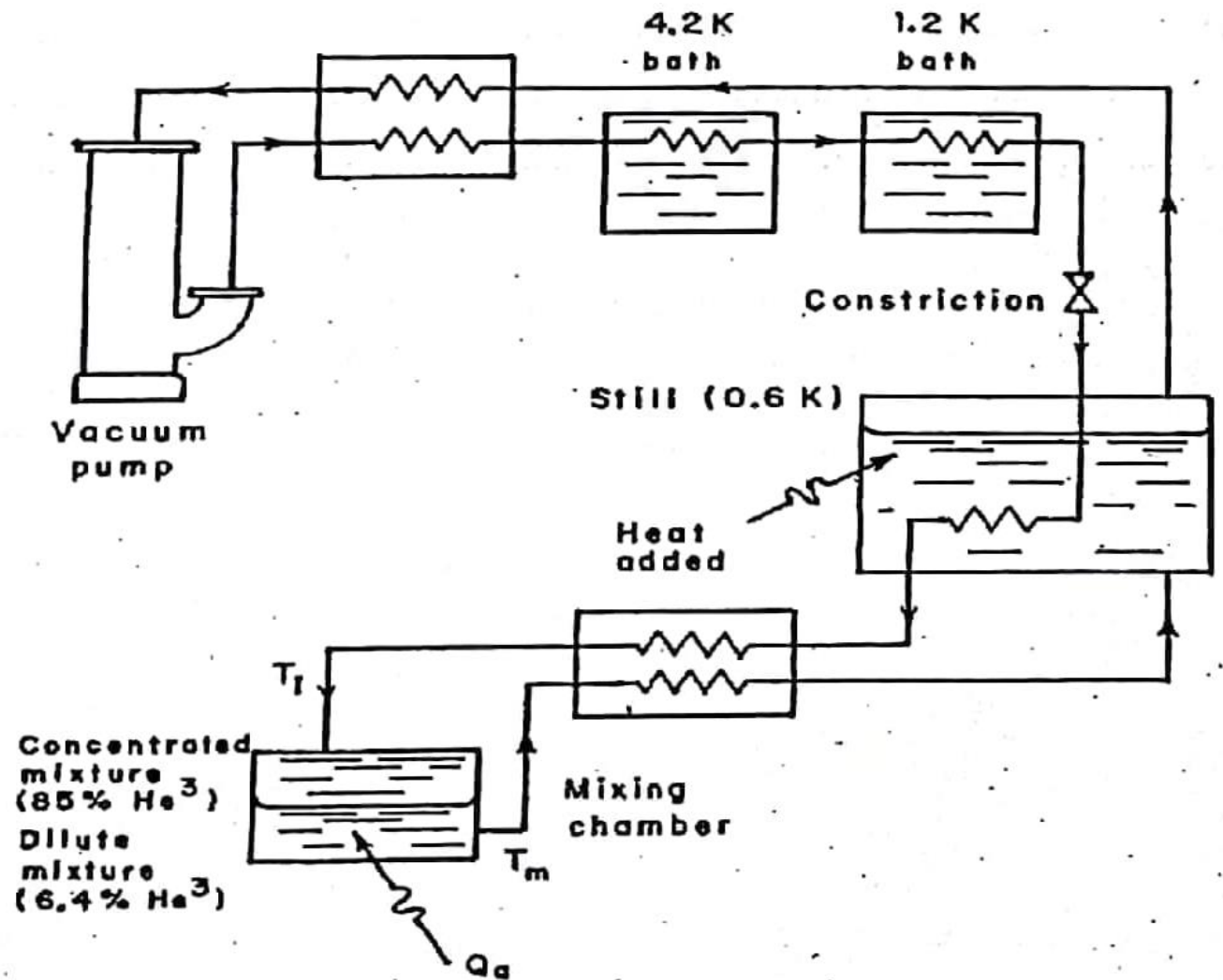
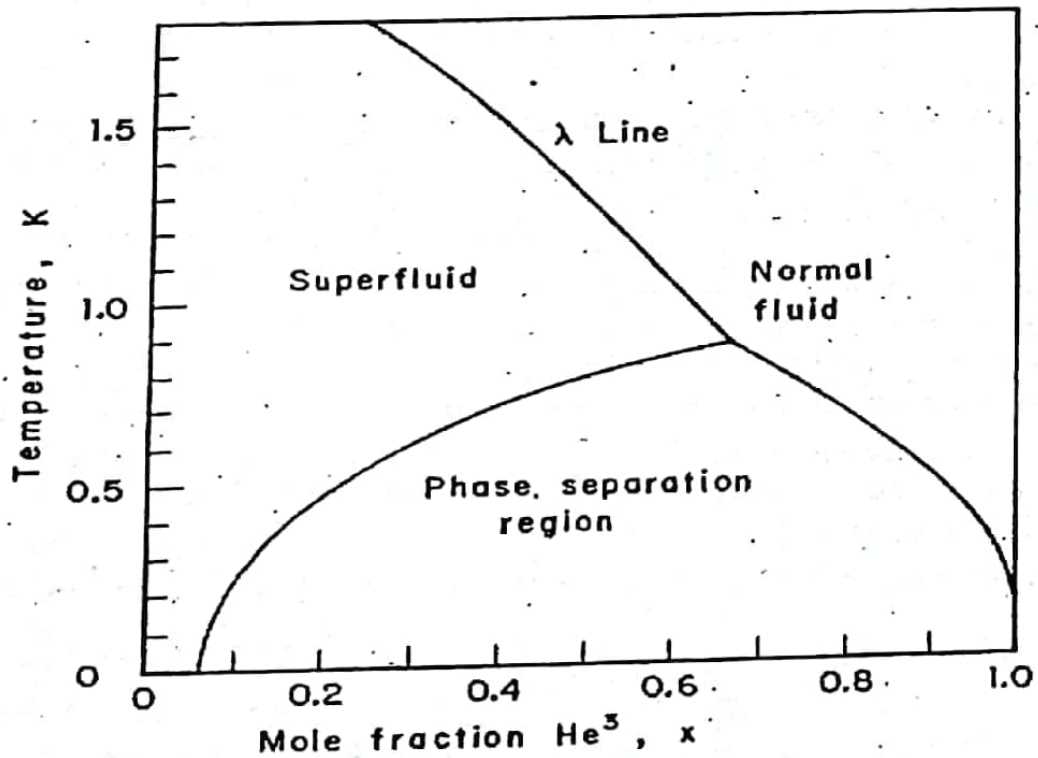


Fig. 5.31. He<sup>3</sup>-He<sup>4</sup> dilution refrigerator schematic.

