

Absorption Refrigeration Cycle Demonstration Apparatus (EDC-ARC-020)

SPECIFICATIONS:

- Ammonia-water solution as working medium.
- Gas/electric boiler to separate ammonia.
- Bubble pump to move the working fluid.
- Adjustable electrical heater at the evaporator to serve as cooling load.
- Boiler heating by electrical heater or gas burner.
- Digital displays for temperature and power.

DESCRIPTION:

This apparatus demonstrates a complete vapor absorption refrigeration cycle, using an environmentally benign ammonia-water solution where ammonia acts as the refrigerant and water as the absorbent. The cycle leverages the strong affinity between these two substances, using thermal energy instead of mechanical compression to produce a cooling effect.

The process begins in the generator, where an electric or LPG heat source boils the solution to separate ammonia vapor from the diluted liquid. The vapor is condensed and then passed through an expansion device into the evaporator, where it boils at low pressure to create refrigeration. The resulting vapor is re-absorbed by the weak solution in the absorber, and the resulting rich solution is pumped back to the generator, completing the cycle.



TECHNICAL DATA:

- **Working fluid:** Ammonia-Water solution
- **Electric heater:**
 - Power: 120W
- **Gas burner:** LPG Operated
- **Evaporator heater:**
 - Power: 50W

Measuring range:

- Temperature: -30 to 150°C
- Power: 0 to 150W

Operational AC power supply:

- 230V, 50Hz, 1 phase

EXPERIMENTAL DATA:

- To demonstrate basic components of an absorption refrigeration cycle process.
- To demonstrate and understand basic processes involved in an absorption refrigeration cycle.
- To experiment with an electric heater or LPG flame in the generator to separate absorbent and refrigerant solution
- Comparison of the refrigeration temperature obtained using LPG or an electrical element as heat source.
- To compute effect of electrical power consumption on overall refrigeration temperature obtained.
- To calculate and compare CoP for different operating conditions.