

Assuming simple absorption cycle, for a plant of 1TR capacity, determine : 1. mass flow rate of water by considering mass balance in absorber; 2. mass flow rate of strong and weak solutions by considering mass balance in absorber ; 3. heat transfer rates in the absorber, generator and condenser ; and 4. C.O.P.

[Ans. 0.09087 kg / min ; 0.8696 kg / min, 0.7787 kg / min ; 288.73 kJ/min, 305.96 kJ/min, 228.22 kJ/min ; 0.686]

### QUESTIONS

1. What is the basic function of a compressor in vapour compression refrigeration system ? How this function is achieved in vapour absorption refrigeration system ?
2. Draw a neat sketch of a practical vapour absorption refrigeration cycle. Indicate thereon the phases of various fluids and the name of the equipments. Also indicate the direction of the external energy flow to or from the equipments.
3. What is the function of the following components in an absorption system :  
(i) Absorber                      (ii) Rectifier                      (iii) Analyser                      (iv) Heat exchangers.
4. Discuss the advantages of vapour absorption refrigeration system over vapour compression refrigeration system.
5. Derive an expression for the C.O.P. of an ideal vapour absorption system in terms of temperature  $T_G$  at which heat is supplied to the generator, the temperature  $T_E$  at which heat is absorbed in the evaporator and the temperature  $T_C$  at which heat is discharged from the condenser and absorber.
6. Draw a neat diagram of three-fluid system of refrigeration (electrolux refrigeration system) and explain its working.
7. Mention the function of each fluid in a three-fluid vapour absorption system.
8. Draw a neat diagram of lithium bromide water absorption system and explain its working. List the major field of applications of this system.

### OBJECTIVE TYPE QUESTIONS

1. The refrigerant, commonly used in vapour absorption system, is  
(a) water                      (b) ammonia                      (c) freon                      (d) aqua-ammonia
2. A vapour absorption system  
(a) gives noisy operation                      (b) gives quiet operation  
(c) requires little power consumption                      (d) cools below  $0^\circ\text{C}$
3. In aqua-ammonia absorption refrigeration system, incomplete rectification leads to accumulation of water in  
(a) condenser                      (b) evaporator                      (c) absorber                      (d) none of these
4. Comparing mechanical vapour compression refrigeration system with absorption refrigeration system, the compressor of the former is replaced in the latter by  
(a) an absorber and a liquid pump  
(b) an absorber, a generator, a liquid pump and a pressure reduction valve  
(c) an absorber, an evaporator, a liquid pump and an expansion valve  
(d) a generator, an evaporator, a liquid pump and an expansion valve
5. The C.O.P. of practical vapour compression system is ..... as compared to that for vapour absorption system.  
(a) more                      (b) less
6. If the C.O.P. of 1 TR ammonia-water absorption refrigeration plant is 0.5, then the heat supplied in the generator is  
(a) 1.5 kW                      (b) 3.5 kW                      (c) 7 kW                      (d) 10.5 kW

7. A rectifier is fitted in an ammonia absorption plant to  
 (a) superheat ammonia vapour  
 (b) remove the unwanted water vapour by heating the vapour mixture  
 (c) remove the unwanted water vapour by cooling the vapour mixture  
 (d) remove the unwanted water vapour by cooling the vapour mixture and condensing the water vapour
8. An electrolix refrigerator is a  
 (a) vapour compression refrigerator  
 (b) vapour absorption refrigerator with a liquid pump  
 (c) vapour absorption refrigerator without any pump  
 (d) none of the above
9. In electrolix refrigerator  
 (a) ammonia is absorbed in hydrogen  
 (b) ammonia is absorbed in water  
 (c) ammonia evaporates in hydrogen  
 (d) hydrogen evaporates in ammonia
10. An electrolix refrigerator is called a  
 (a) single-fluid absorption system  
 (b) two-fluid absorption system  
 (c) three-fluid absorption system  
 (d) none of these
11. The fluids used in the electrolix refrigerator are  
 (a) water and hydrogen  
 (b) ammonia and hydrogen  
 (c) ammonia, water and hydrogen  
 (d) none of these
12. Hydrogen is used in electrolix refrigeration system so as to ..... the vapour pressure ammonia in evaporator.  
 (a) equalise  
 (b) reduce  
 (c) increase
13. An electrolix refrigerator has  
 (a) only one liquid pump  
 (b) only two liquid pumps  
 (c) no liquid pump  
 (d) none of these
14. In aqua-ammonia and Li-Br water absorption refrigeration systems, the refrigerant are respectively  
 (a) water and water  
 (b) water and Li-Br  
 (c) ammonia and Li-Br  
 (d) ammonia and water
15. In a lithium bromide absorption refrigeration system  
 (a) lithium bromide is used as a refrigerant and water as an absorbent  
 (b) water is used as a refrigerant and lithium bromide as an absorbent  
 (c) ammonia is used as a refrigerant and lithium bromide as an absorbent  
 (d) none of the above

**ANSWERS**

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|---------|---------|---------|---------|---------|
| 1. (d)  | 2. (b)  | 3. (a)  | 4. (b)  | 5. (a)  |
| 6. (c)  | 7. (d)  | 8. (c)  | 9. (c)  | 10. (c) |
| 11. (c) | 12. (b) | 13. (c) | 14. (d) | 15. (b) |