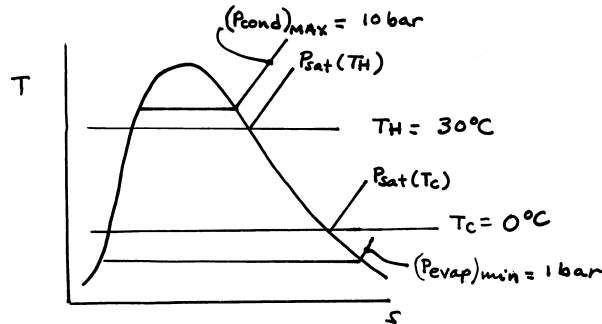


PROBLEM 10.19

KNOWN: For a Vapor-compression refrigeration cycle, the minimum and maximum allowed refrigeration pressures are 1 and 10 bar, respectively. The cold and warm region temperatures are also specified.

FIND: Among several candidate working fluids, determine which (if any) can be used for this duty.

SCHEMATIC & GIVEN DATA:



ASSUMPTIONS:

1. The refrigeration cycle adheres to the model presented for the vapor-compression cycle in Sec. 10.2

ANALYSIS: For heat transfer to the working fluid passing through the evaporator from the cold region, we must have

$$1 \text{ bar} \leq P_{\text{evap}} \leq P_{\text{sat}}(T_c)$$

For heat transfer from the working fluid passing through the condenser to the warm region, we must have

$$P_{\text{sat}}(T_H) \leq P_{\text{cond}} \leq 10 \text{ bar}$$

working fluid	table	$P_{\text{sat}}(0^\circ\text{C})$	$P_{\text{sat}}(30^\circ\text{C})$	Feasible
R22	A-7	4.98 bar	11.93 bar	No - $P_{\text{sat}}(30^\circ\text{C})$ too high
R134a	A-10	2.93	7.7	yes
Ammonia	A-13	4.3	11.69	No - $P_{\text{sat}}(30^\circ\text{C})$ too high
Propane	A-16	4.74	10.8	No - $P_{\text{sat}}(30^\circ\text{C})$ too high