Physics 112
Exam 1
Winter 1995
Sid Rudolph

#5

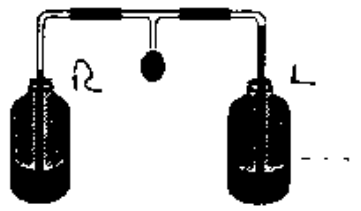
1

Name: _____

Social Security #: _____ 34 PTS

TA (circle one): Bird Denholm Harrison Johnston Roberts Wilcox

2 A. The drawing to the right shows glass tubing, a rubber bulb and two bottles. Is the situation you see possible? If so, carefully describe what has taken place in order to produce the situation depicted. 6 POINDS

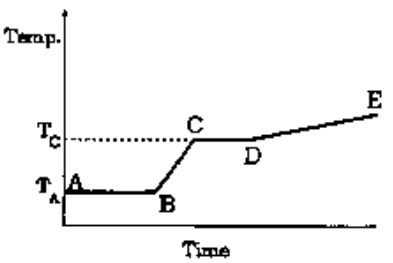


THE SITUATION IS POSSIBLE. THE DENSITY OF THE LIQUID IN BOTTLE L < ρ_R. INITIALLY THE BULB IS SQUEEZED AND RELEASED. AS A RESULT THE PRESSURE IN THE GLASS TUBE < P_0 AND THE LIQUIDS WILL RISE UP THE TUBES. IN BOTH CASES $P_{top} + \rho g h = P_0$

THUS, $\rho_R g h_R = \rho_L g h_L$ AND SINCE $\rho_L < \rho_R$, $h_L > h_R$

IGNORE 15 POINTS

B. Heat is added to an unknown solid initially at temperature T_A at a uniform rate. The temperature-time plot is shown to the right.

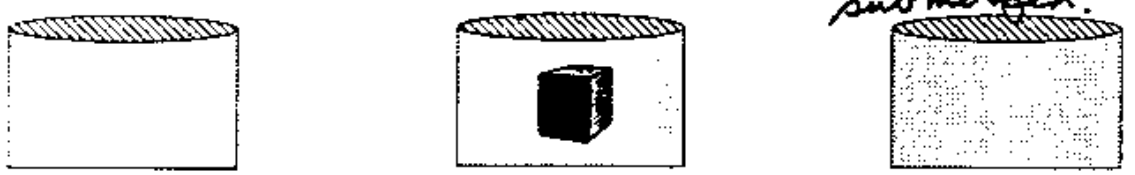


3 PTS EACH

1. AB — Region where solid is melting.
2. CD — Region where liquid vaporizes.
3. MELTING — The process involving the larger latent heat.
4. DE(VAPOR) — The region showing the larger specific heat capacity.
5. T_A — The melting temperature of the solid.
6. T_C — The boiling temperature of the liquid.

C. 10 PTS The picture depicts three glass vessels, each filled with a liquid. The liquids each have different densities, and $\rho_A > \rho_B > \rho_C$. In vessel B sits an unknown block halfway to the bottom.

and completely submerged.



2 PTS EACH

1. C — In which vessel would the block sit on the bottom?
2. A — In which vessel would the block float on the top?
3. C — In which vessel would the block feel the smallest buoyant force?
4. A & B — In which vessels are buoyant forces on the block are the same?
5. SINK — Assume the coefficient of volume expansion for B and the block are $\beta_B > \beta_{block}$. If the temperature of vessel B with the block is raised, would block B rise to the surface, sink to the bottom, or remain where it is?

the liquid in