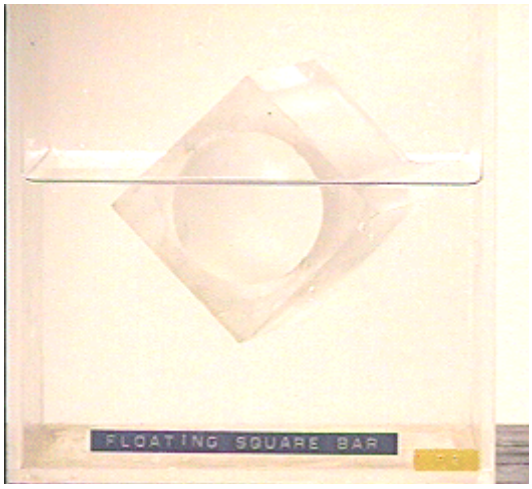
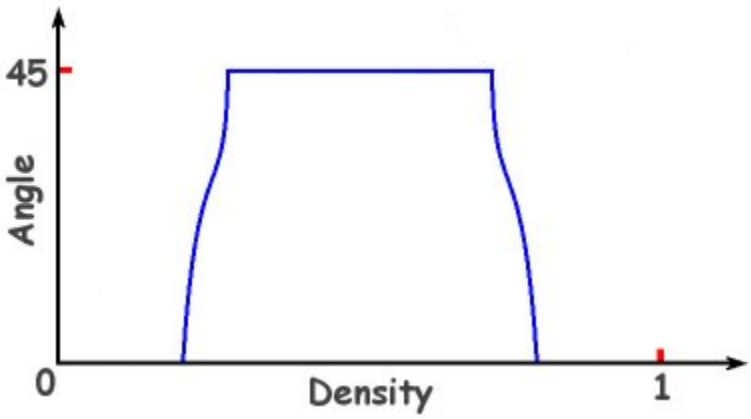
Answer #256

The answer is (e): the bar will tilt to a diagonal orientation and rise slightly out of the liquid, as seen in the photograph below.



The bar rises out of the fluid slightly because its density is slightly less, relative to the liquid, than the original situation (floating in methyl alcohol). It rotates because it becomes unstable when its density becomes sufficiently small relative to the liquid. When it rotates its center of mass will be lower than when it is in the original orientation. The calculation of this effect produces an interesting result: as the density of the bar increases, it remains flat to a point, then slowly rotates to its diagonal position, then remains diagonal. A graph of the angle of the floating bar as a function of its density relative to that of the liquid is shown below.



There are a number of very interesting situations involving symmetric objects of varying density floating in a liquid bath. See the references for the demonstration associated with this question (Demonstration F2-32) for more information.

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For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.