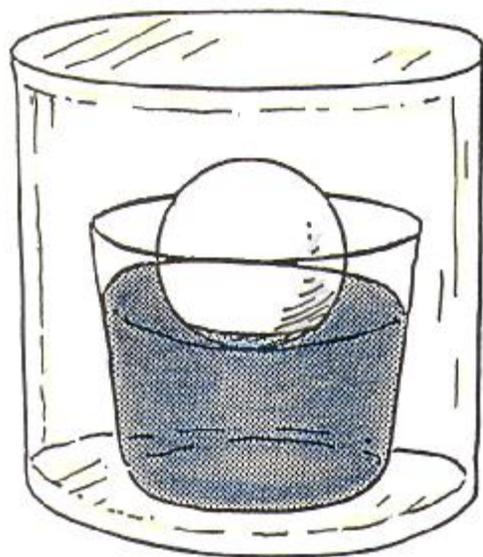


NEXT-TIME QUESTION

CONCEPTUAL Physics



Consider a Ping-Pong ball floating in a glass of water that is enclosed in an air-tight chamber.

When air pressure is increased in the chamber, does the ball float lower, higher, or as before?



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In "less than, equal to, or greater than" type problems, exaggerate what's happening and the answer is easier to visualize. When compressed-air density equals the ball's density, the ball is supported by the air alone and lifts completely out of the water.

Answer:

The ball will float higher. The buoyancy that accounts for its flotation is due to the weight of the displaced fluid—both water and air. Higher-pressure air is denser air, and the greater weight of displaced denser air by the ball contributes to greater buoyancy by the air. This lifts the ball upward and the ball floats higher in the water.

If you said increased air pressure would poke the ball farther into the water, maybe you didn't realize that the greater pressure is also transmitted through the water and acts upward on the ball's bottom. Because the bottom of the ball is deeper, pressure there is greater than pressure on the top—which accounts for buoyancy to begin with!

Since water is practically incompressible, the extra air pressure does not increase the water's density—only the air density is affected by the greater air pressure.



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