How and Why*

David Ropeik

Q. What is the densest element?

A. At the level of a single atom, there's no topping uranium.

Most of the weight and density of an atom comes from the protons and neurons in its nucleus. Uranium (Ur), element 92, has 92 protons in the nucleus, along with 146 neutrons. That gives it a total atomic weight of slightly more than 238. It's the heaviest naturally occurring element.

Since all atoms are about the same size, the more protons and neutrons an atom is packed with, the denser it is. Think of it like grains of sand inside a ping pong ball. The more grains a ball is packed with, the denser it is.

Lead (Pb) is atomic number 82, atomic weight 207. If Superman couldn't see through Pb, he sure couldn't see through Ur.

But when a bunch of atoms join and form a molecule, Osmium (os) wins the density title. Atom for atom it's only a middleweight, number 76, atomic weight 190. But when Osmium atoms form a molecule, they can squeeze together in a way that takes up less space than when uranium or lead atoms bond together. It's like being able to pack more grains of sand inside the ping pong ball. More atoms in the same space means a heavier, denser molecule.

Osmium has a density of 22.583 grams per cubic centimeter. Uranium is 19.07. Lead is 11.34 Rock averages around 3. Water is 1. Butter is .86. Cork is .22.

