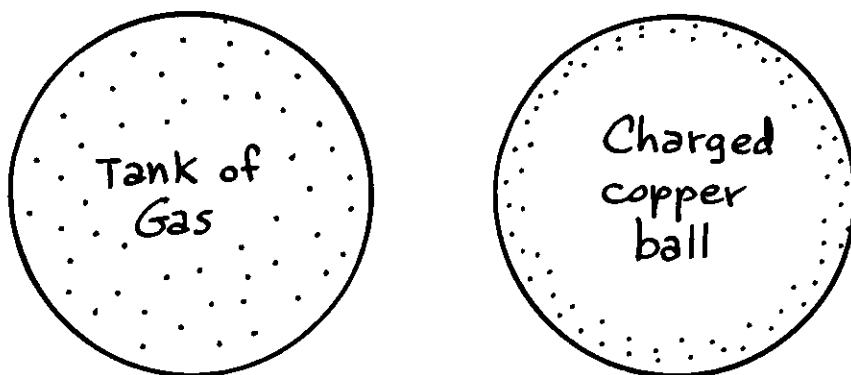


ANSWER: ELBOW ROOM

The answer is: b. Offhand you might expect that the electrons, like the gas molecules, would spread themselves throughout the volume of the copper ball, thereby giving each electron as much elbow room as possible between itself and its neighbors. But that is not what happens. The electrons all crowd on or near the outer surface of the copper ball. Why the dramatic difference between the electron and the gas distribution? Because the gas molecules only interact with their nearest neighbors by physically hitting them. Molecules exert short-range forces on each other. A molecule has no interaction with a distant molecule on the other side of the gas tank. The molecules distribute themselves so as to maximize the distance between their immediate neighbors.



On the other hand, the electron is able to interact with distant electrons by means of its field. It can exert a force on another electron without being near to it. An electron maximizes its distance, not from its nearest neighbors, but from ALL the electrons in the copper ball. The electron ends up accepting a few close neighbors in return for getting all the other electrons as far away as possible. "As far away as possible" means on the other side of the ball. Electrons exert long-range forces on each other.

The electrons that make a metal object negatively charged are always spaced along the outer surface of the object.