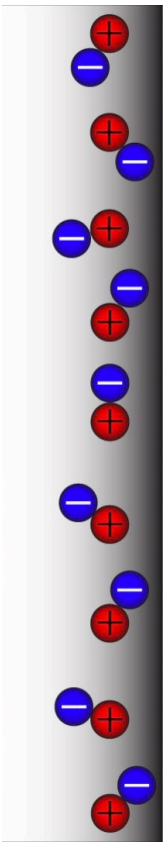
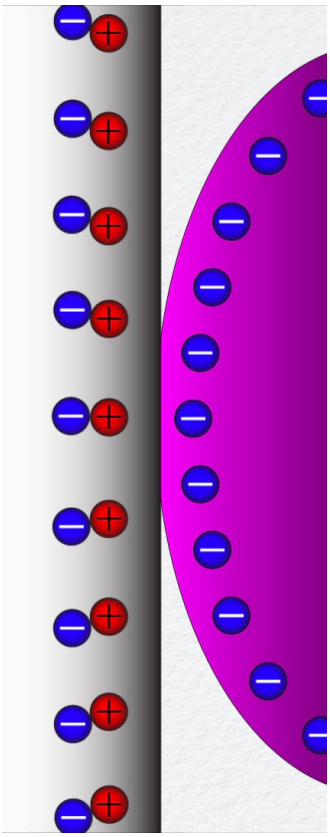
Flipping Physics Lecture Notes:
Polarization of Charge
https://www.flippingphysics.com/polartization-of-charge.html



A charged balloon is attracted to a wall because the molecules in the wall become polarized. Polarization does not mean the wall becomes charged, it simply means the molecules in the wall have aligned themselves such that there will be a net attractive force between the wall and the charged balloon.

To the right is an illustration of electrons and protons randomly oriented in the wall before the charged balloon is brought close to the wall.



When the balloon is brought near the wall (left illustration), the electrons in the wall move away from the electrons in the balloon because, according to the Law of Charges, the electrons in the wall will be repelled from electrons in the balloon because they both have negative charges.

We know like charges repel and unlike charges attract, however, it is important to notice that all the like charges are farther apart than all of the unlike charges. And because the electric force between the charges will be determined by Coulomb's Law: $F_e = \frac{kq_1q_2}{r^2}$, we know the closer the charged objects are to one another, the smaller the "r" value in Coulomb's Law and therefore the larger the electric force.

In other words, because the opposite charges are closer than the like charges, the attractive electric force is larger than the repulsive electric force and the net electric force between the balloon and the wall is an attractive force. This is how a charged object can be attracted to a neutrally charged object.

Two other examples of attracting by polarization are that the charged balloon can pick up little pieces of paper and cause an aluminum can to roll. In both cases, the charged balloon polarizes the other objects, the little pieces of paper and aluminum can, and therefore the objects are attracted to one another.

Please realize the electric forces in the polarization demonstrations are quite small. The masses of the balloon and little pieces of paper are small, so only a small electric force is required to hold them up and it only requires a small force to roll the aluminum can.

The electric force caused by polarization is typically larger for a conductor than an insulator, Because, in insulators, electrons are just pushed to the opposite side of the atom, however, in conductors, the electrons are free to move about more and actually end up farther away. That will produce a larger difference in attractive vs repulsive force and a larger net electric force in a conductor than an insulator.