Midterm Friday

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- Leave an empty seat between you and your neighbour(s) if possible.

Midterm Friday

- Bring with you

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  - The “standard” calculator

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- TAs will collect the tests at the ends of the rows rather than manage a stampede to the front.

Midterm Friday

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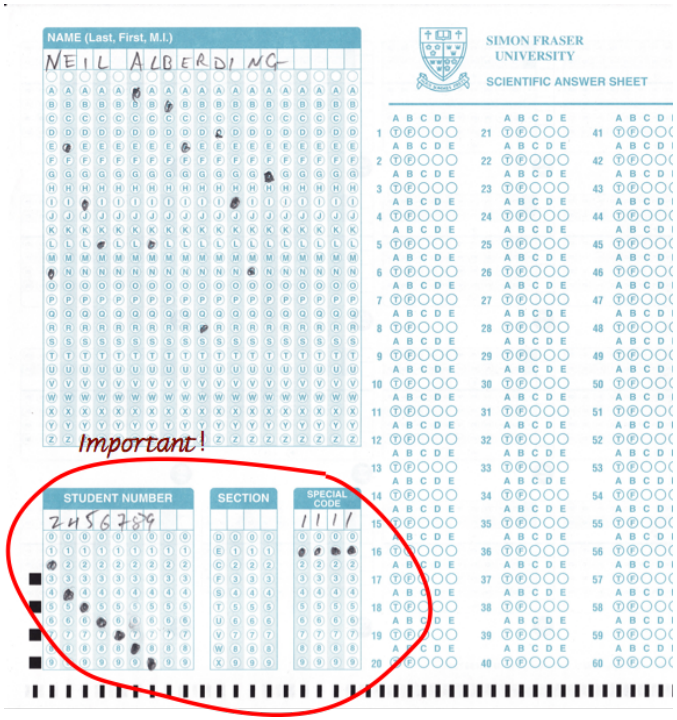
- Write you name and student number on the exam and the bubble sheet. Fill in the “Special Code” of your exam on the bubble sheet. Be sure to fill in the bubbles too.



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- We will start with chapter 26 and plough straight ahead through about 10 chapters.

Electricity and Magnetism

	Gravity	Weak (Electroweak)	Electromagnetic (Electroweak)	Strong
Carried By	Graviton (not yet observed)	W^+ W^- Z^0	Photon	Gluon
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- You are most aware of gravity and EM forces in your everyday life because they are infinite range.
- EM interactions are solely responsible for the structure of matter. Much of physics, all of chemistry and most of biology deals with EM interactions. EM interactions allow life to exist.

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- We live in a technoligical world driven my EM devices. From the power plant to your toaster...it is inescapable.
- Furthermore, all that “light” stuff we have been doing has been about EM waves....but we never defined EM....

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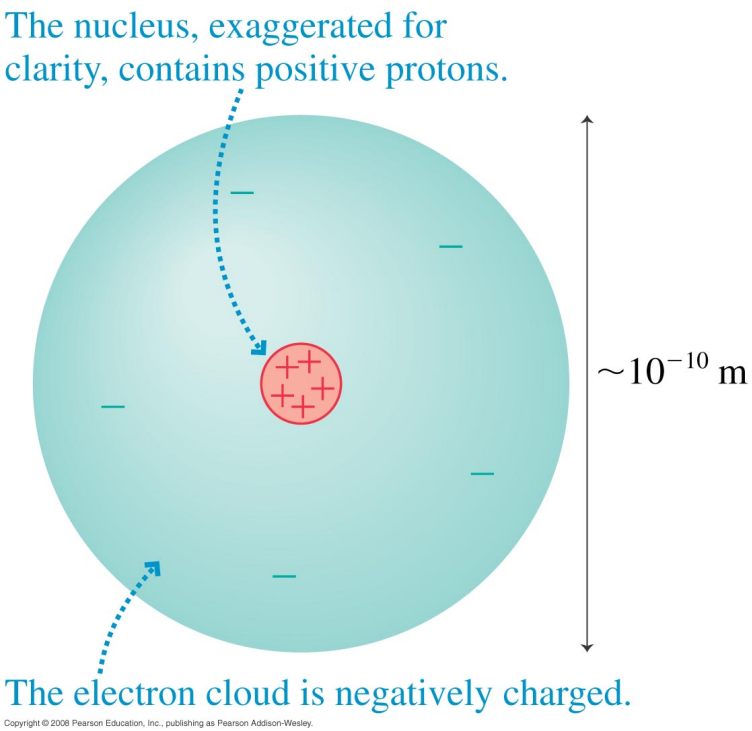
- In the end you should get a clear picture of how electricity and magnetism are linked and how to apply EM theory to the world around you.

Electric Charge (26.1 and 26.2)



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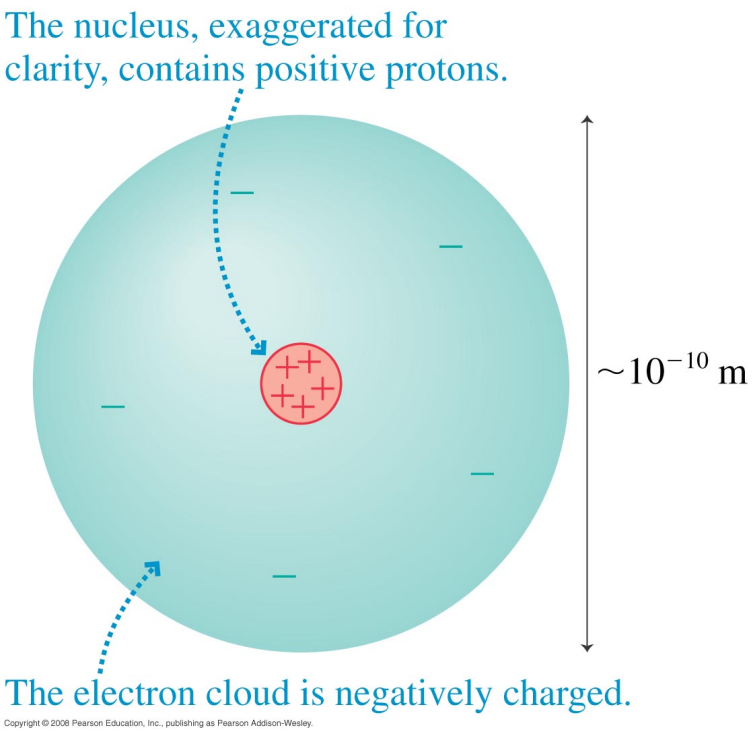

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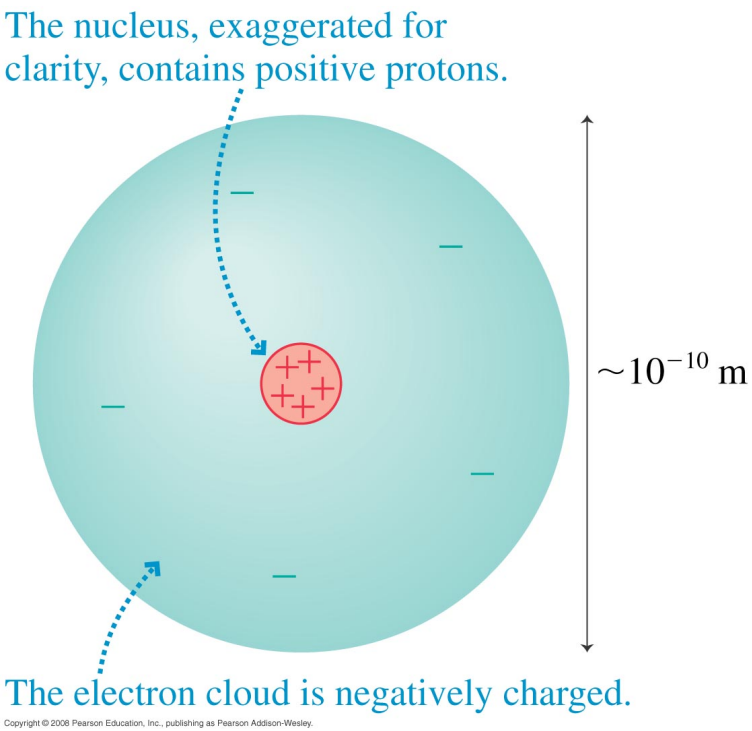

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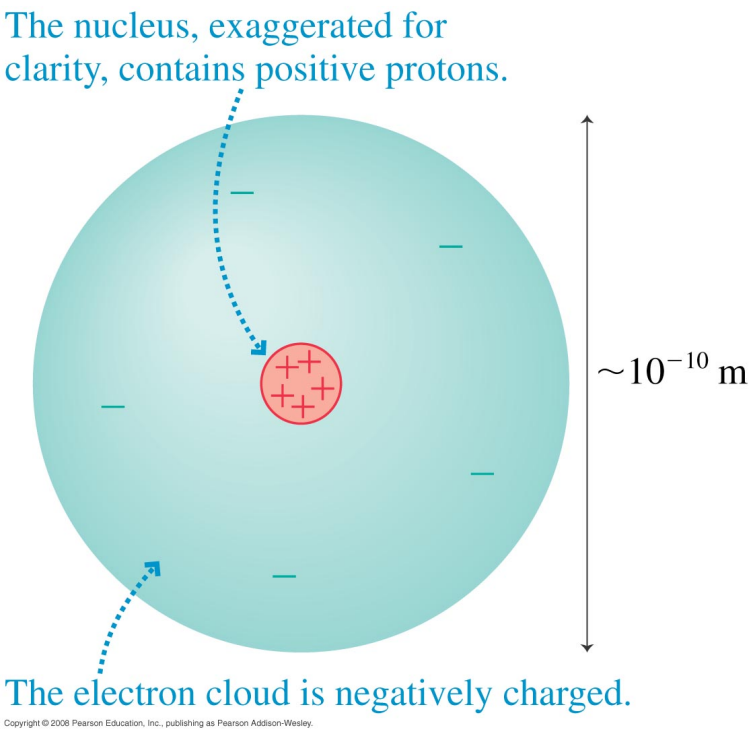

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- Charge is a fundamental property of a particle....like mass. It is not possible to have a chargeless electron.
- If we want to understand electric forces we have to start with the concept of a charge. (in a way, it defines the force - it is the strength of the interaction).

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- Charge is quantized. The electron and the proton have exactly equal charges with opposite charges:

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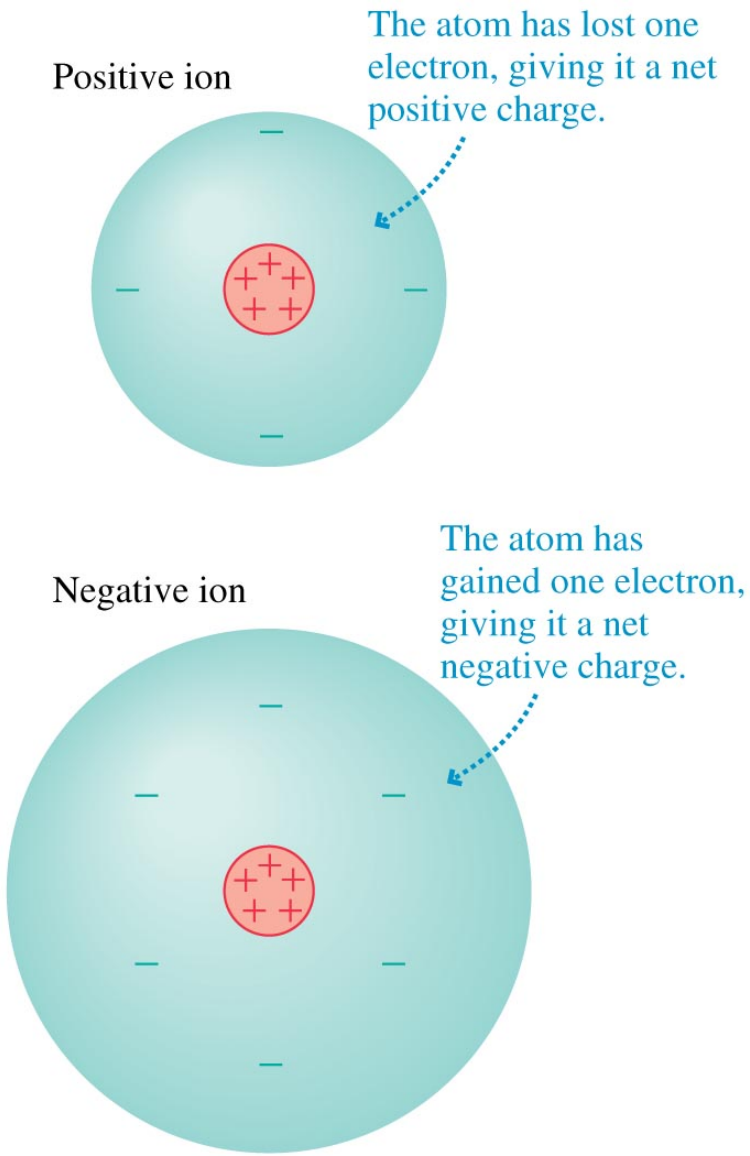
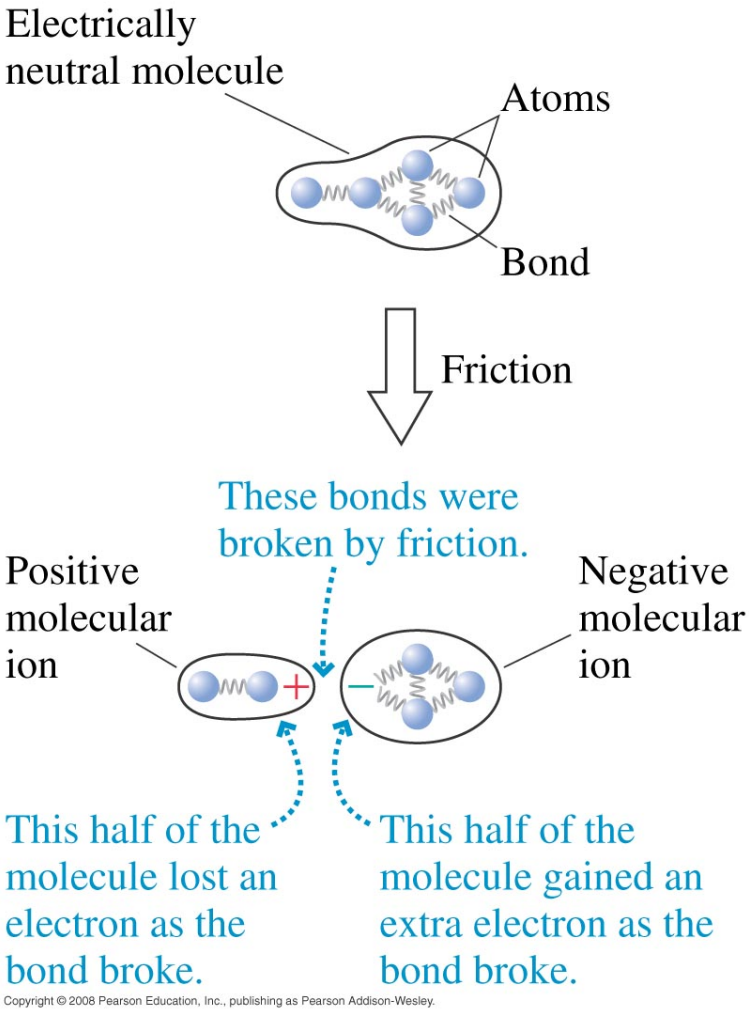
- Charge is conserved.

Ionization



- While matter is generally neutral, it can gain a net charge. An atom can become an ion.

Ionization



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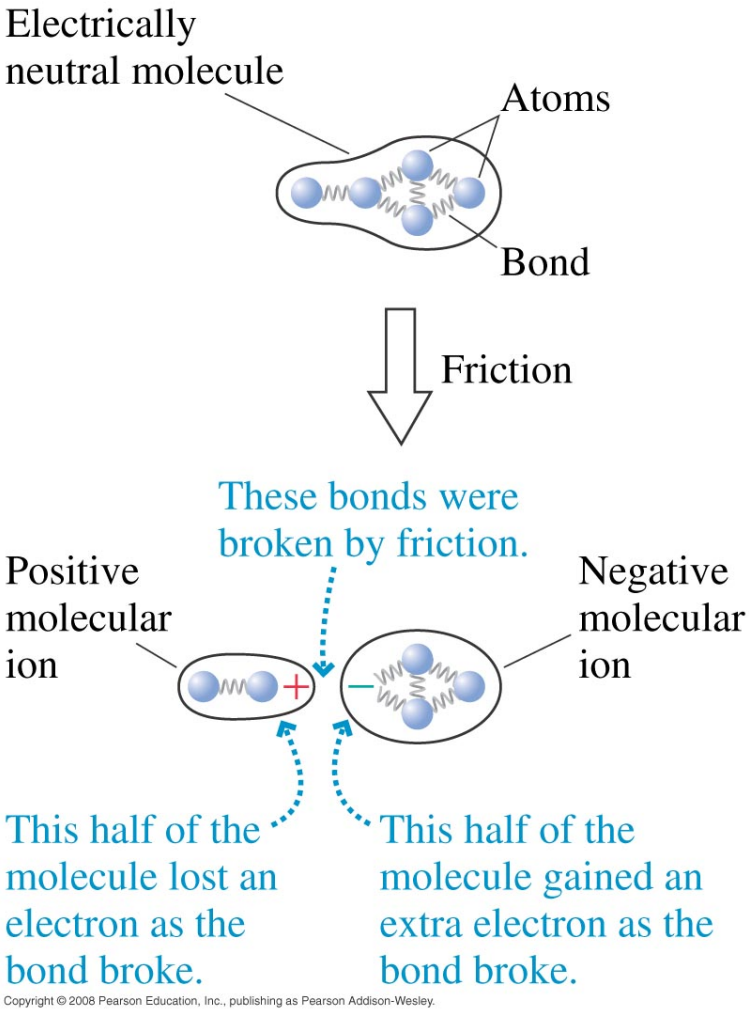

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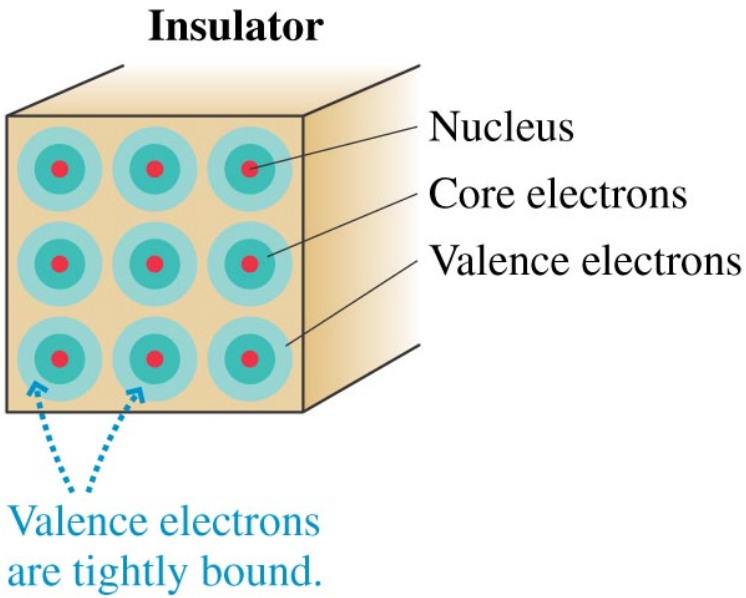
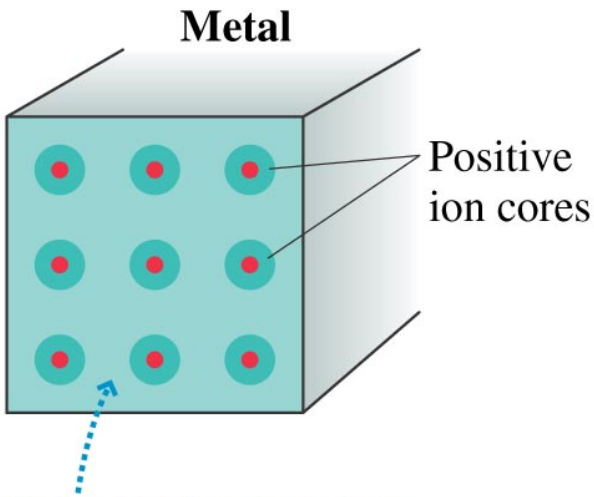
- One surface ends-up with the negative molecular ion while the other ends up with the positive molecular ion.

Insulators and Conductors (26.3)



- Electrons in an insulator are tightly bound and do not free to migrate.



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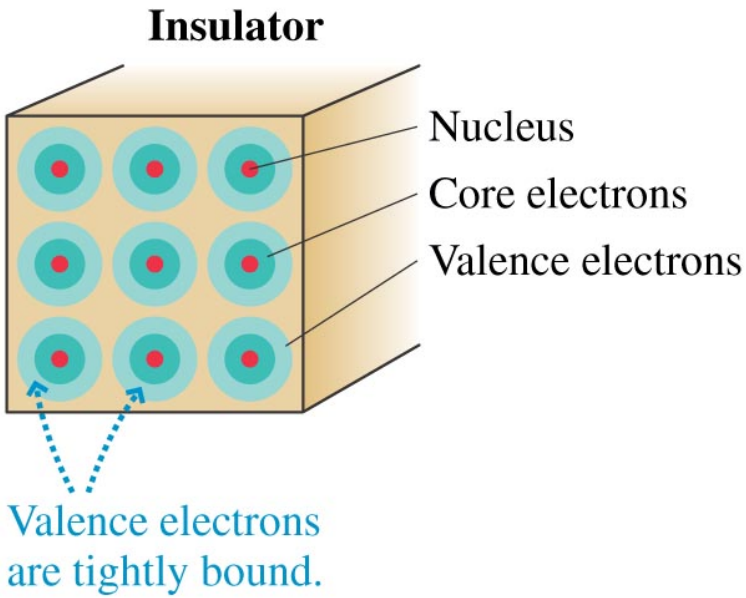

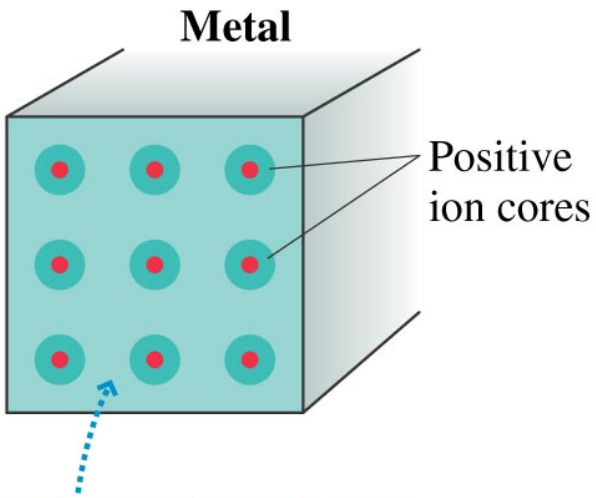

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- In conductors the outer atomic (valence) electrons are weakly bound and can flow.

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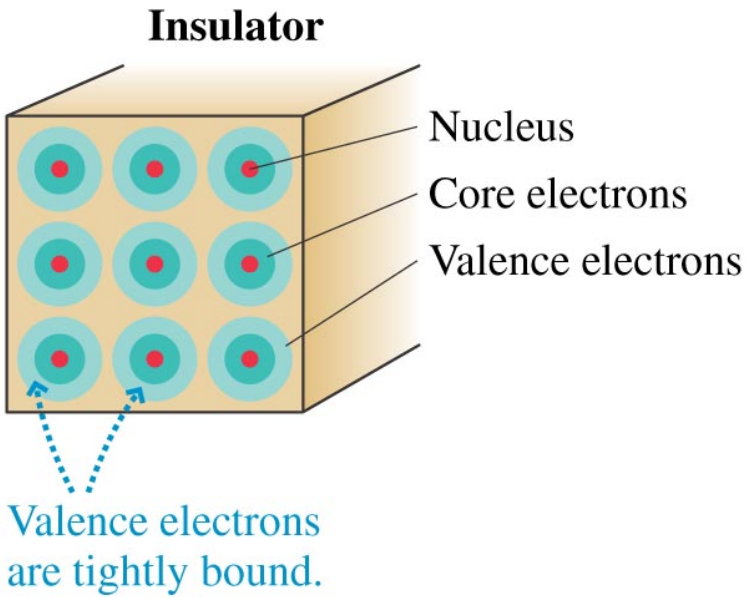

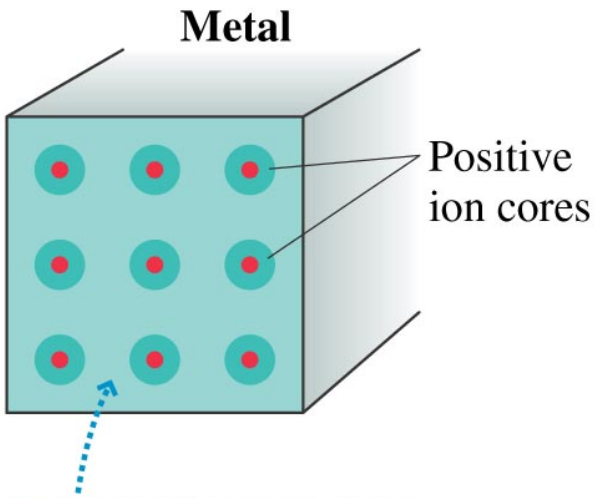

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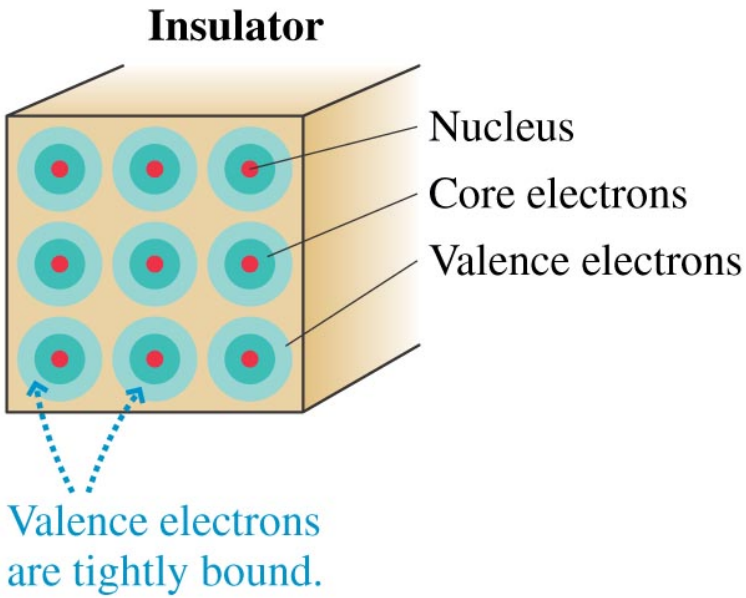

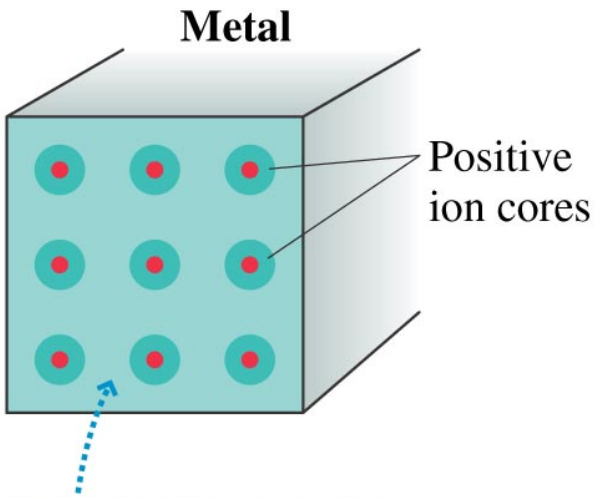

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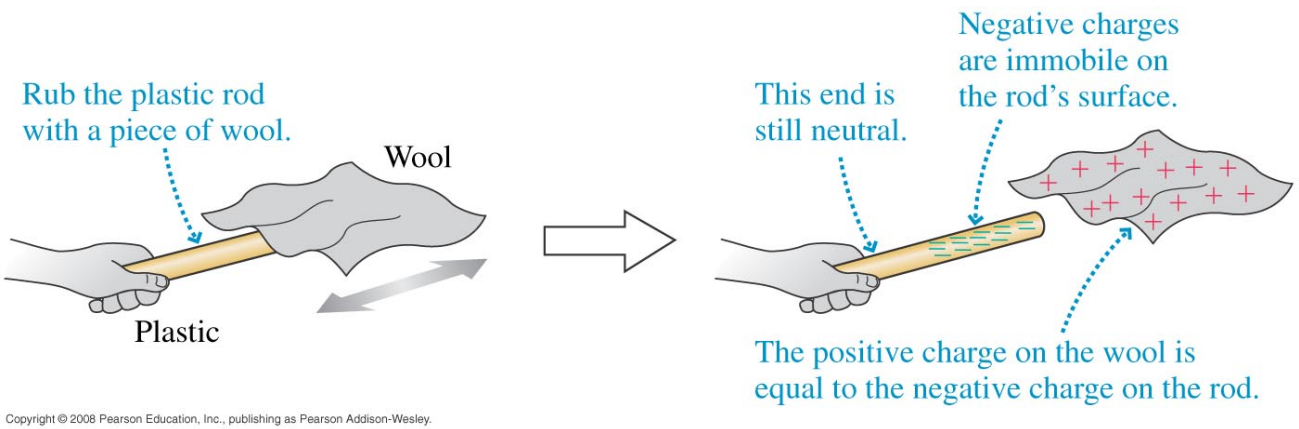
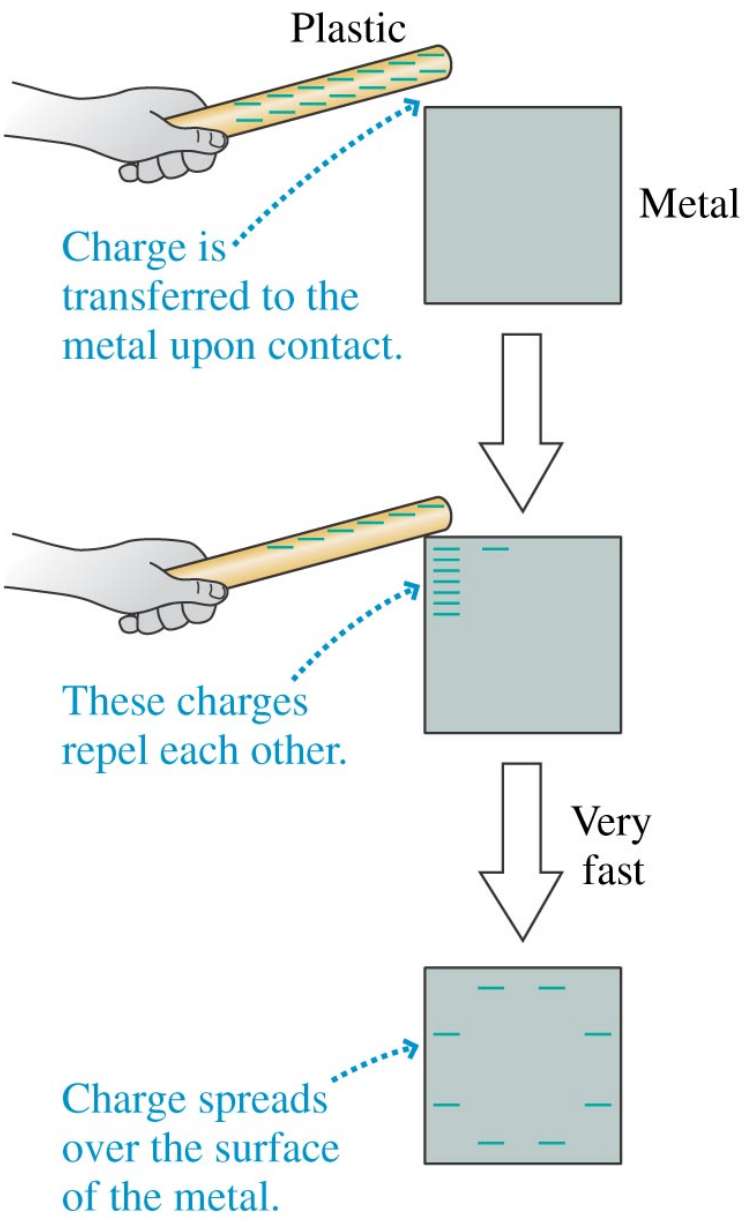
- In conductors the outer atomic (valence) electrons are weakly bound and can flow.
- These properties are really about the flow of charges, not the net charge on the material.
- The charge carriers are the electrons and their motion is called a current.

Charging an Insulator



- Insulators can be charged by rubbing, but that charge does not move around.

Charging a Conductor



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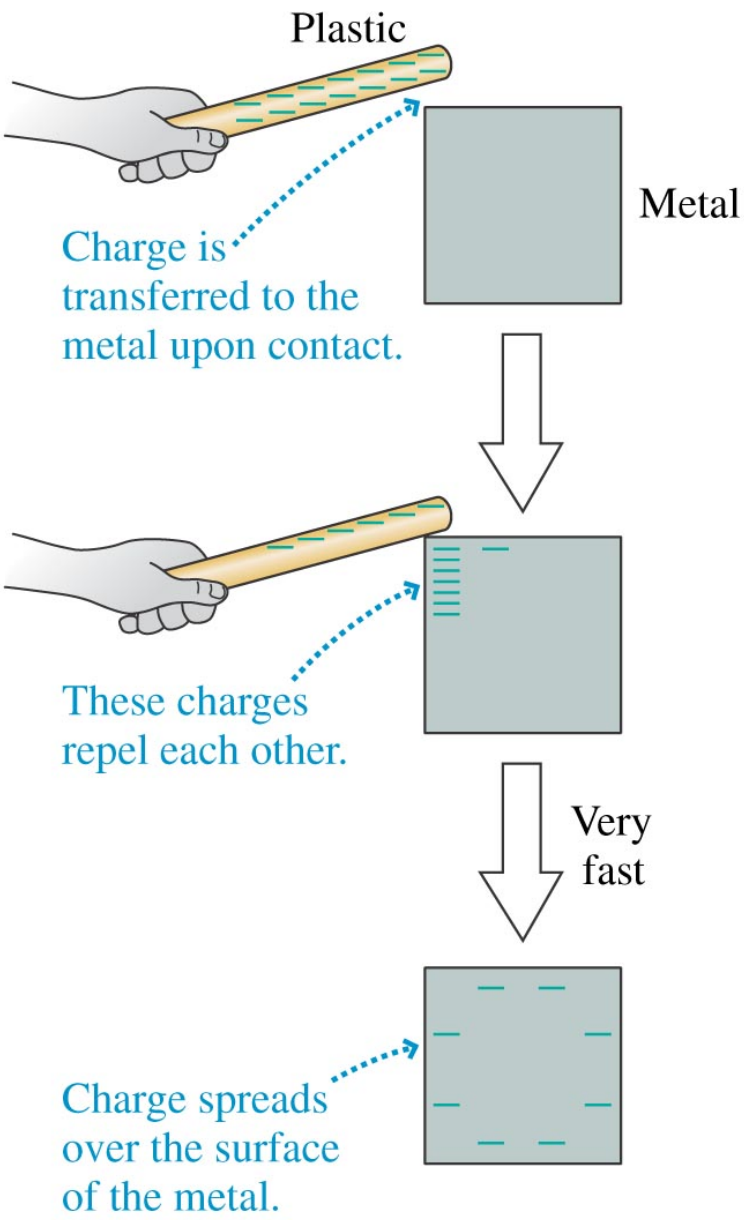

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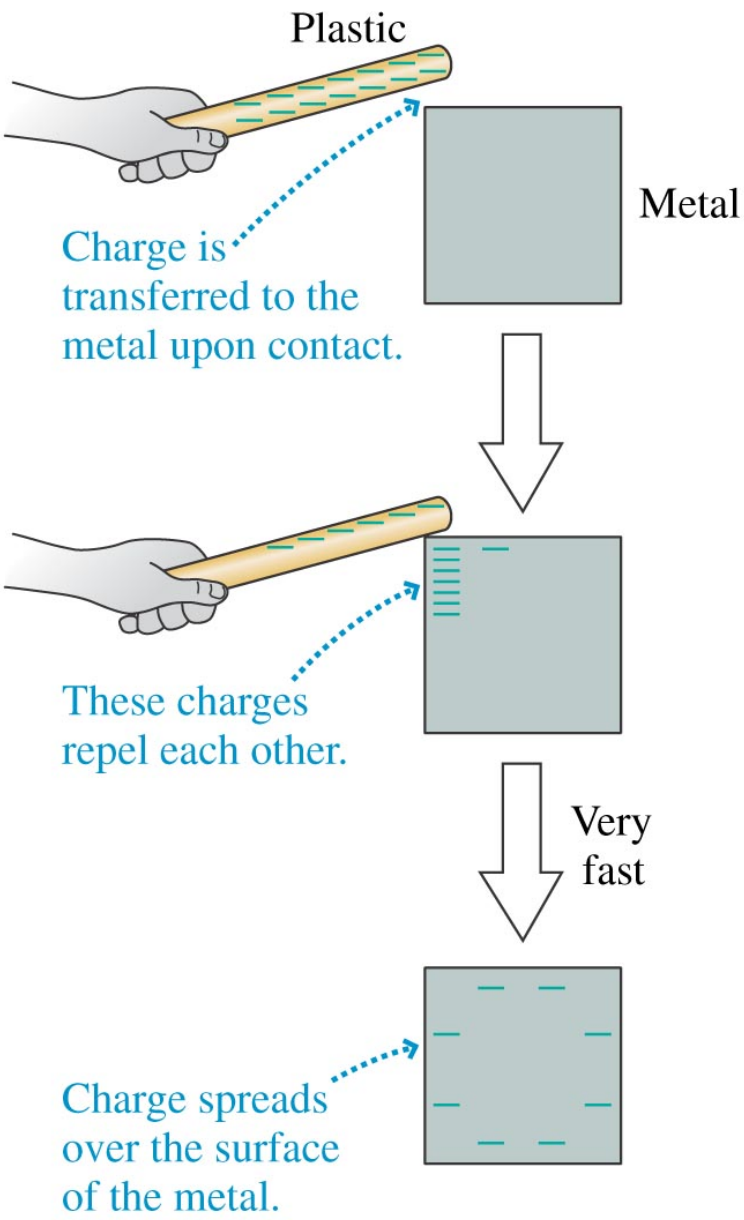

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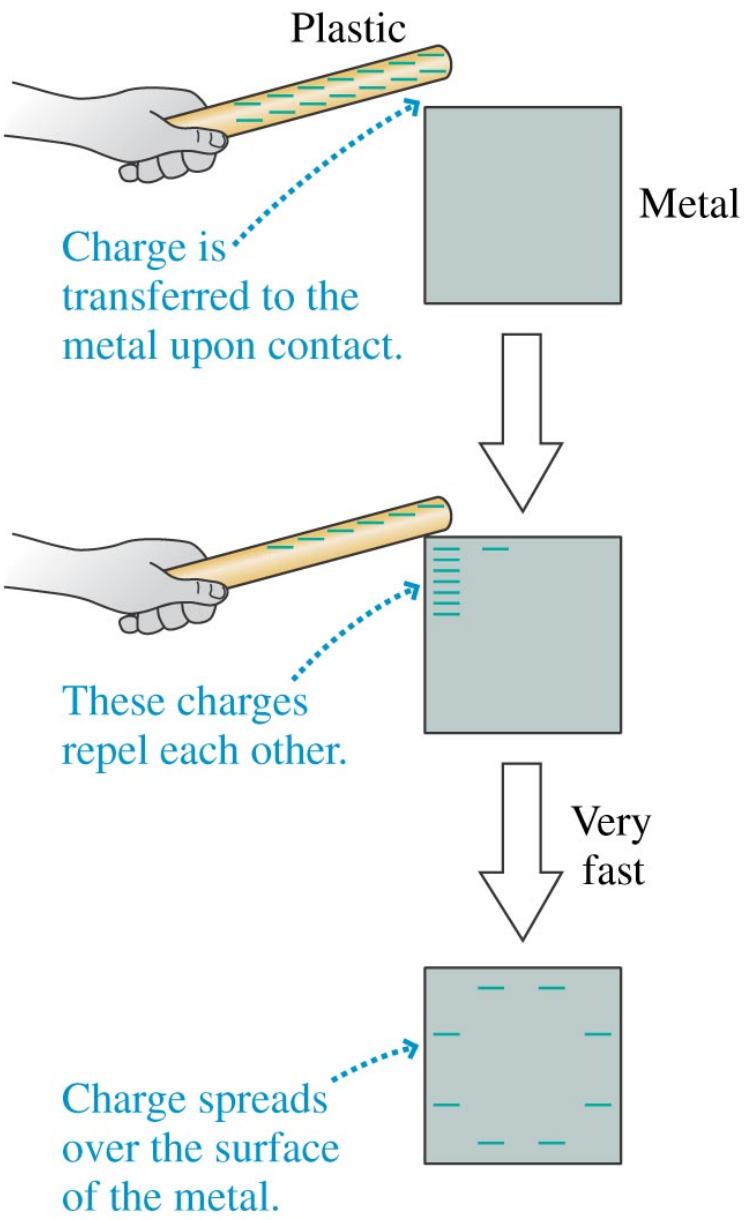

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- Once the charges adjust electrostatic equilibrium is reached and there is no net force on any charge.
- In an isolated conductor, any excess charge is located on the surface.