**The Periodic Table**  
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**Learning Target:**

I will be able to describe the nature of metallic bonding and apply the theory to explain metallic properties such as thermal and electrical conductivity, malleability, and ductility.

**Criteria for Success:**

I can explain why the sea of electrons in metals gives metals their unique properties.

**Introduction to metallic bonds**

1. The chemical bonding that results from the attraction between metals atoms and the surrounding sea of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bonding.
2. Most metals have very few \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in their outermost energy shells, and some have vacant outer electron orbitals. That means its valence electrons are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and free to move around.
3. When metals are next to each other, the valence electrons don't just stay on their own atom; they roam around the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Each metal atom allows its electrons to \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_, so these atoms become positively charged cations.
   1. These cations are kind of like a positively charged island and are surrounded by a sea of negatively charged electrons. The attraction between the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ center is a metal bond.

**Metallic bond properties**

1. In metal bonds, the electrons \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ around in an electron sea, and this leads to metals' unique properties.
   1. Metal \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ well because all of the mobile electrons are free to move towards any attraction.
   2. Metals have \_\_\_\_\_\_\_\_\_\_\_ (shiny) because it reflects incoming light photons (because of the free electrons.)
   3. It is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because the structure and uniform bonding in all directions of the metal allow the atoms to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ past each other without breaking.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the ability of a substance to be hammered or beaten into thin sheets.
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the ability of a substance to be drawn or pulled through a small opening to produce a wire.