

## The Properties of Metals

Until about 5,000 B.C., people made tools and implements from stone. Around 5,000 B.C., it was probably noticed that melted copper ran from green ore in a pottery kiln. Around that same time, gold was discovered and used for decorations. Metals became prized for jewelry because of their luster. By 3500 B.C., humankind discovered that melting copper together with tin formed a harder metal, heralding the start of the Bronze Age. Around 1500 B.C., technology leapt forward once again when the hotter ovens of that age enabled the extraction of iron, an even harder and more abundant metal, from its ore. In many ways, we are still in the Iron Age. Modern civilization depends on alloys of iron for its bridges, skyscrapers, and automobiles. The physical properties of metals that make them so useful are due to metallic bonding which makes them both strong and flexible.



**Read the description of metallic bonding below, and answer the questions that follow based on your knowledge of chemistry and metals in particular.**

1. Why are metallic bonds both strong and flexible? \_\_\_\_\_

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2. Why are metals able to conduct both heat and electricity well? \_\_\_\_\_

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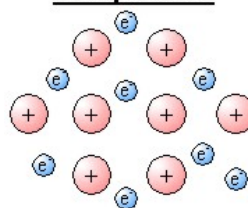
3. The valence electrons of metals jump easily to a higher energy orbital when light shines on them. Then they fall emitting the excess energy as light. Which property of metals is explained by this? \_\_\_\_\_

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### Metallic Bonding

Metals have low ionization energies. This means they hold onto electrons loosely. As a result, in a metal crystal, the valence electrons move easily and do not belong to any single atom. Since the atoms in the crystal do not hold on to their own valence electrons, they become like cations in a sea of mobile electrons. The attraction between the cations and the electrons holds the metal crystal together.

#### Group 1 metal



#### Group 2 metal

