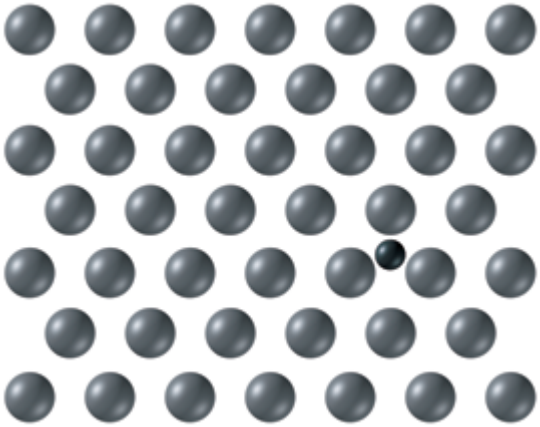
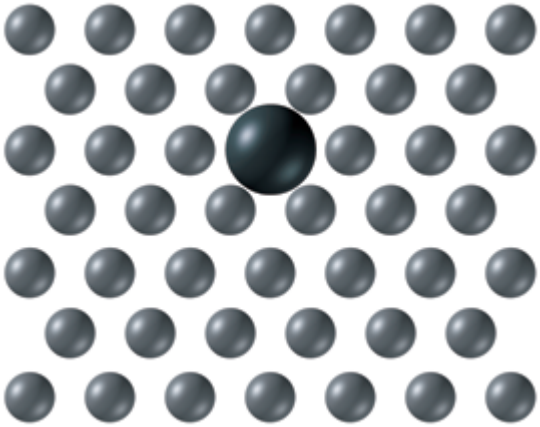


Interstitial crystal
A smaller atom or ion fits into a small space between particles in the array.



Substitutional crystal
A larger atom or ion is substituted for a particle in the array.

Structures and Preparation of Alloys

Alloys generally crystallize in one of two ways, depending on relative sizes of atoms. If the atoms of one of the metals present are small enough to fit into the spaces between the atoms of the second metal, they form an alloy with an interstitial structure (*inter* means "between," and *stitial* means "to stand"). If atoms of the two metals are of similar size or if one is larger, the atoms of one metal can substitute for the atoms of the second metal in its crystalline structure. Such alloys are substitutional alloys. Models for both types of crystals are shown above.

Techniques for making alloys depend on the metals used in the mixture. In some cases, the two metals can simply be melted together to form a mixture. The composition of the mixture often varies within a range, evidence that the final product is indeed a mixture and not a compound. In other cases, one metal may be melted first and the second dissolved in it. Brass is prepared in this way. If copper and zinc were heated together to a high temperature, zinc (bp 907°C) would evaporate before copper (mp 1084°C) melted. Therefore, the copper is melted first, and the zinc is added to it.

Brass has a high luster and resembles gold when cleaned and polished. A brass object can be coated with a varnish to prevent reactions of the alloy with air and water.

Sterling silver is more widely used than pure silver because it is stronger and more durable.