

Metallic Structures

Example One

Sodium has a melting point of 98°C while magnesium has a melting point of 667°C . Explain this difference.

Example Two

Which statement is false?

- (a) Metals conduct electricity through the movement of metal ions.
- (b) Metallic solids exhibit a wide range of melting points according to their component bonds.
- (c) The metallic solid can be viewed as positive ions closely packed in a sea of valence electrons.

Example Three

How do metals conduct electricity?

- (a) Movement of anions
- (b) Movement of cations
- (c) Movement of electrons
- (d) Movement of protons
- (e) Movement of atoms

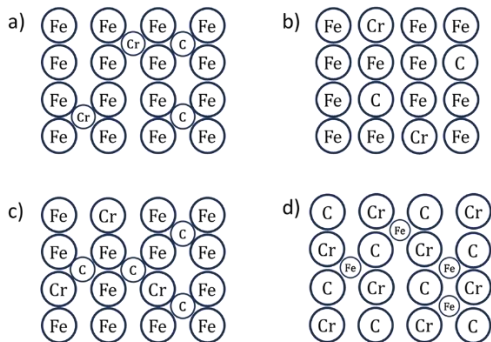
Example Four

You have a material with a very high melting point ($\sim 2000\text{ }^{\circ}\text{C}$), that does not conduct electricity in the solid state or when molten. What is the most likely type of material for this substance.

- (a) Ionic Compound
- (b) Network Covalent Material
- (c) Molecular Compound
- (c) Metallic Material

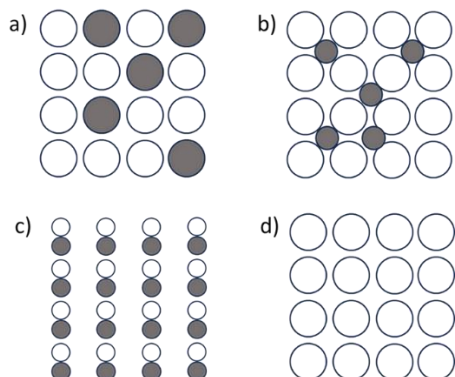
Example Five

Stainless steel is composed of three main elements: iron, chromium and carbon. Which diagram best represents of stainless steel at the particle level?



Example Six

Brass is an alloy made of copper and zinc. Which diagram best shows the arrangement of copper and zinc atoms within the alloy? What type of alloy is brass?



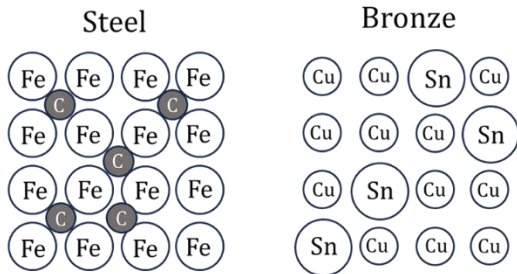
Example Seven

Which of the following two metals might be used to make a substitutional alloy and why?

- (a) In and Ga because they are in the same group
- (b) Ca and Ga because they have very dissimilar radii
- (c) In and Ga because they both can form +3 charges
- (d) Ti and V because their radii are the most similar

Example Eight

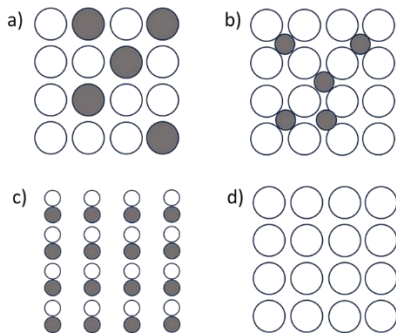
The alloys bronze and steel are shown in the diagrams below. Which answer correctly relates the malleabilities of the alloys to the malleability of the pure metal structure?



- a. Both metal alloys would show increased malleability compared to their pure metal forms.
- b. Both metal alloys would show decreased malleability compared to their pure metal forms.
- c. Brass would show similar malleability when compared to pure copper but Steel would show decreased malleability compared to pure iron.
- d. Brass would show decreased malleability when compared to pure copper but Steel would show increased malleability compared to pure iron.

Example Nine

Which diagram represents an alloy of Ni and B?



Example Ten

White gold is an alloy of gold consisting of similarly sized metal atoms of Au (135 pm radius) and Pd (140 pm radius). Draw a diagram showing the atomic arrangement of metal atoms within white gold if the composition is 25% Pd and 75% Au. Your picture should include metal atoms in the correct proportion and arrangements dictated by the composition and type of alloy.

Element	Atomic Radius (pm)
Au	135
Pd	140

