

Exercise walk-through

2.4

Structure of Metals and Alloys

AP Chemistry

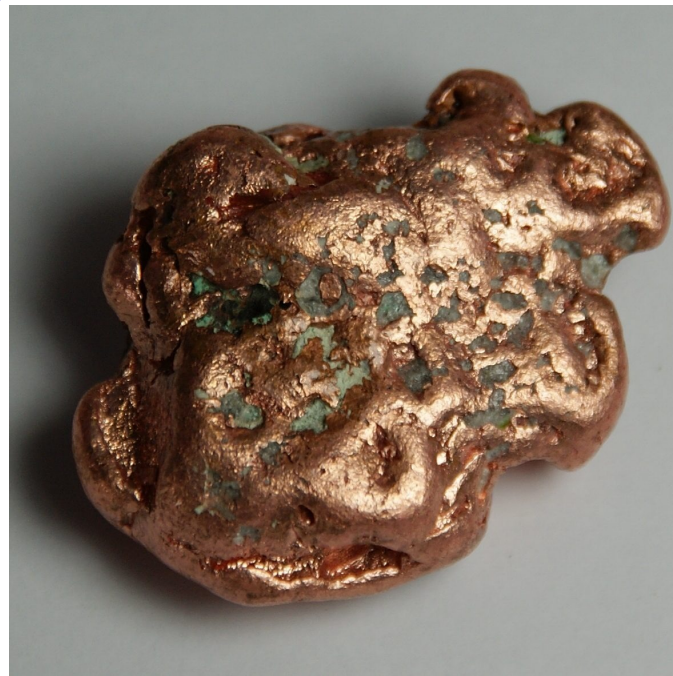
Metals and alloys

The **sea of electrons** : fixed + ions in a sea of **delocalized electrons** .

This explains:

- conductivity (electrons drift)
- **malleability** (layers slide)
- **luster** (electrons reflect light)

Alloys : substitutional (brass) or interstitial (steel) – both harder.



Metals share a sea of delocalised electrons

Exercises 2.1-2.3

2.1 What carries the electric current in a metal?

[1]

2.2 Explain why metals are malleable.

[2]

2.3 Name the two types of alloy.

[2]

Exercises 2.1-2.3

2.1 What carries the electric current in a metal? [1]

2.1

- The delocalized (free) electrons
-

2.2 Explain why metals are malleable. [2]

2.2

- Layers of metal cations can slide over each other while the delocalized electrons still hold them together, so the metal deforms without breaking
-

2.3 Name the two types of alloy. [2]

2.3

- Substitutional and interstitial

Exercise 3.1

3.1 Metallic bonding is best described as

[1]

☐

A shared pairs of electrons between two atoms

B transfer of electrons to form ions

C cations in a sea of delocalized electrons

D no electron interaction

Exercise 3.1

3.1 Metallic bonding is best described as

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3.1 C

- cations in a sea of delocalized electrons

Exercise 3.2 (a)

3.2 Steel is an alloy of iron and a small amount of carbon.

(a) State whether it is interstitial or substitutional, with a reason.

[2]

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3.2 Steel is an alloy of iron and a small amount of carbon.

(a) State whether it is interstitial or substitutional, with a reason.

[2]

(a)

- Interstitial – carbon atoms are much smaller than iron and fit in the gaps between iron atoms

Exercise 3.2 (b)

3.2 Steel is an alloy of iron and a small amount of carbon.

(b) Explain why steel is harder than pure iron.

[2]

Exercise 3.2 (b)

3.2 Steel is an alloy of iron and a small amount of carbon.

(b) Explain why steel is harder than pure iron.

[2]

(b)

- The carbon atoms disrupt the regular layers so they cannot slide easily, making the metal harder

Exercise 3.3

3.3 Explain why metals conduct electricity in both the solid and molten states, unlike ionic compounds. [2]

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3.3

- In a metal the delocalized electrons are mobile in both the solid and the molten state; an ionic compound needs its ions to move, which happens only when molten or dissolved