

## Alloys and sculptures

An alloy is a substance with metallic properties containing at least one metal element. Examples of alloys are steel (iron and carbon), brass (copper and zinc) and bronze (copper and tin). Metals represent the most of the periodic table, even if non-metals are more abundant in nature.

Thanks to their unique properties, metals have always been used by artists throughout the centuries to give full play to their imagination, whether to create art hanging on the walls or on tables or freestanding sculptures.

In this chapter we are going to deal with some well-known metals including aluminium, copper, iron and zinc.

## Copper sculptures

Copper is one of the most versatile metals. It can change its colour naturally or chemically or creating a patina with heat. There are many ways to colour copper: using, for example, a torch or different chemicals up to reach the desired colour spectrum. It allows you to obtain numerous selections of colours for your sculptures or water fountains, even for outdoor ones. Otherwise, copper will patina naturally depending on the climatic conditions: in many outdoor climates the patina will give the copper a green hue. In a dry hot climate, instead, copper will probably not patina turning into a deeper brownish colour. Besides a more humid climate will lend the copper a more dramatic natural patina. Copper can be sculpted into the most detailed figures according to its thickness. If it is too thick, it is very difficult to work. There are many different ways to shape and work copper, thanks to its properties and using several instruments: the final outcome depends on the artist's fancy and his aim.

It often happens that sculptures and statues are made up of several metals. An example is the Statue of Liberty: it has a steel core covered by copper sheets. Some details, mainly on the skin, were realized using the Repoussé technique, consisting, in that case, in hammering the back side of the sheets to create a low relief. Its «green» colour, finally, is the copper natural patina.

## Brass and bronze sculptures

Brass is an alloy that consists of both copper and zinc in varying proportions, but typically containing 67% copper and 33% zinc. Bronze is made up of copper and a smaller percentage of tin. Its properties of extending make it particularly suitable to fill the finest details of a mold. It is moreover resistant to corrosion especially due to seawater: that's why bronze is the most frequently employed metal. It can be worked using different casting processes: wax casting, sandcasting and centrifugal casting.

Brass, just like copper, will patina naturally and through chemical processes, whose result is just like the natural one, but faster. Nowadays several durable lacquers and polymeric laminates are available to guarantee the preservation of its primary shine: if properly applied finishes like powder coatings and vapour-deposition organic coatings can protect brass sculptures for a long time, regardless of weather conditions.

## Iron and steel sculptures

Iron is one of the most used metals, malleable and ductile and it is one of the most abundant in nature too. Steel is the best known alloy of iron, but it is malleable only under proper conditions. Its weight and metal characteristics make it stable and long lasting. It is necessary to treat steel used for outdoor sculptures: oil/linseed oil & turpentine, in equal parts, avoid the oxidation and give the sculptures a shiny aspect. This treatment must be taken periodically, to prevent rust. Evidently iron and steel are not appropriate for outdoor water fountains: their oxidation would give rusty brown water. For these purposes bronze, brass and copper are the best.

## Activities

### True (T) or False (F)?

- T  F 1) An alloy is a metal you find spontaneously in nature.
- T  F 2) The periodic table is rich in metals.
- T  F 3) Copper cannot be coloured chemically.
- T  F 4) A more humid climate gives the Copper a green hue.
- T  F 5) Bronze is very hard to model.
- T  F 6) Thanks to an appropriate finishing, bronze sculptures can last indefinitely.
- T  F 7) Steel is very easy to work.
- T  F 8) Iron and steel tend to oxidate.

### Tick the correct answer

- |  |  |  |
|--|--|--|
| <b>1) Copper will not probably patina:</b> | <b>2) Bronze and brass are alloys realized with:</b> | <b>3) You can avoid the oxidation of iron and steel:</b> |
| a) using chemicals.                        | a) a percentage of iron.                             | a) treating them with specific oils.                     |
| b) in a hot dry climate.                   | b) a small quantity of aluminium.                    | b) thanks to shiny finishes.                             |
| c) in a humid climate.                     | c) copper.   | c) with chemical patina.                                 |

### Complete the sentences with the correct word

- 1) Copper patina depends on ..... conditions.
- 2) If copper is too ....., it is very difficult to work.
- 3) In many ..... the patina will give the copper a green hue.
- 4) Bronze is very resistant to ..... due to seawater.
- 5) Brass, as ....., will patina naturally too.
- 6) Weight and metal characteristics of ..... make it stable and long lasting.
- 7) To prevent ..... iron and steel need to be treated periodically with specific oils.
- 8) Iron and steel are not suitable for ..... water fountains.

## Keys

### True (T) or False (F)?

- 1) An alloy is a metal you find spontaneously in nature.
- 2) The periodic table is rich in metals.
- 3) Copper cannot be coloured chemically.
- 4) A more humid climate gives the Copper a green hue.
- 5) Bronze is very hard to model.
- 6) Thanks to an appropriate finishing, bronze sculptures can last indefinitely.
- 7) Steel is very easy to work.
- 8) Iron and steel tend to oxidate.

### Tick the correct answer

#### 1) Copper will not probably patina:

- a) using chemicals.
- b) in a hot dry climate.**
- c) in a humid climate.

#### 2) Bronze and brass are alloys realized with:

- a) a percentage of iron.
- b) a small quantity of aluminium.
- c) copper.**

#### 3) You can avoid the oxidation of iron and steel:

- a) treating them with specific oils.**
- b) thanks to shiny finishes.
- c) with chemical patina.

### Complete the sentences with the correct word

- 1) Copper patina depends on CLIMATE conditions.
- 2) If copper is too THICK, it is very difficult to work.
- 3) In many OUTDOOR CLIMATES the patina will give the copper a green hue.
- 4) Bronze is very resistant to CORROSION due to seawater.
- 5) Brass, as COPPER, will patina naturally too.
- 6) Weight and metal characteristics of STEEL make it stable and long lasting.
- 7) To prevent OXIDATION iron and steel need to be treated periodically with specific oils.
- 8) Iron and steel are not suitable for OUTDOOR water fountains.