METALS AND ALLOYS

الجامعة المستنصرية/ كلية العلوم

علوم الفيزياء

المرحلة الدراسية : الرابعة

م.م. مصطفى عبد الجليل رحيم

METALS AND ALLOYS

INTRODUCTION :

Beginning of the Material Science - People began to make tools from stone – Start of the Stone Age about two million years ago. Natural materials: stone, wood, clay, skins, etc. The Iron Age began about 3000 years ago and continues today

- Metal: element that readily loses electrons to form positive ions, characterized by high electrical conductivity and malleable
- Alloy: combinations of metals in a crystalline structure

Metals And Alloys are divided into two main categories :

1- FERROUS : Ferrous metals contain iron as the main component. Unprotected ferrous metals are extremely susceptible to corrosion commonly referred to as rust, which can occur almost immediately under the correct conditions. Rust is a continuous process, as the rust flakes off the surface exposing fresh metal. Steel (a common alloy) is used in almost every aspect of our lives from cars, buildings and bridges to chairs, cooking utensils and paper clips. Consequently, ferrous metals with their vast use in our environment require protection to ensure corrosion does not occur.

2-NON-FERROUS :

Non ferrous metals are metals that do not contain iron. Examples include aluminum, zinc and copper. In general non ferrous metals do not corrode as quickly as ferrous metals due to the rapid formation of a thin protective oxide layer on their surface although they are still susceptible to corrosion when exposed to atmospheric conditions. Due to the presence of the surface oxides, non-ferrous metals have different requirement for surface preparation and priming than ferrous metals.

Processing and structure

- View of iron powder

Properties of metals

- 1 a) physical properties of metals :-
- Metals are solids. (except mercury)
- Metals are hard. (except lithium, potassium, sodium)
- Metals have metallic luster. (shine)
- Metals are malleable. (can be beaten into thin sheet)
- Metals are ductile. (can be drawn into wires)
- Metals have high melting points.
- Metals have high boiling points.
- Metals are good conductors of heat.
- Metals are good conductors of electricity.
- Metals are sonorous. (produce sound when beaten)

b) Chemical PROPERTIES

- Metals are usually inclined to form cations through electron loss, reacting with oxygen in the air to form oxides over various timescales (iron rusts over years)

STRUCTURE OF METAL

- CRYSTAL STRUCTURE FOR METALIC ELEMENTS
- The most common types of space lattice or unit cells with which most common metal crystallise , are ;
- Body –centered cubic structures (BBC).
- Face-centered cubic structures (fcc).
- Hexagonal closed – packed structures (HCP) .

The Application of metals and alloys in daily live

- the metal is used in the fields of trade in general, including where it enters in cars, planes and other construction materials industry, especially iron and aluminum, as well as other metals such as copper, which is used in electrical wiring industry and another metals such as gold, lead, etc.


SUISSE
1KILO
GOLD
9950
A414694
A414693

magnesium-containing

Aluminium Alloys in Aerospace

Airbus A340

References

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- 2- Kittel, C., 1976. *Introduction to solid state physics* (Vol. 8). New York: Wiley.

Thanks For Listening