ENGINEERING CHEMISTRY

Department of Science and Humanities

ENGINEERING CHEMISTRY

Corrosion Chemistry

Class content:

- ***Corrosion control***
  - ***Metal coating***
    - ***Galvanisation***

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Corrosion Control

Protective coating	• Metallic coating • Inorganic coating • Organic coating
Corrosion Inhibitors	• Anodic Inhibitors • Cathodic Inhibitors
Cathodic protection	• Sacrificial Anode method • Impressed cathodic current method
Anodic Protection	• Impressed anodic current method

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Protective coatings:

Metallic coating:

• Corrosion of base metal is prevented by coating a layer of **another metal** over it

• Metal coated may be anodic or cathodic to the base metal

Anodic metal coating:

Coating of a layer of metal which is anodic to base metal

e.g. , Iron article coated with Zinc

Cathodic metal coating:

Coating of a layer of metal which is cathodic to base metal

e.g. , Iron article coated with Tin

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Anodic metal coating:

Coating metal is **more active** with respect to the base metal

Even if the base metal is not completely covered, it will **not undergo pitting corrosion**

e.g., Coating of Zn or Mg on iron

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Galvanizing:

- Coating a layer of **zinc on iron** is called galvanization
- The following steps are involved in the process:

- Iron sheet is passed through **organic solvent or caustic solution** to remove oil or grease present on it

- It is washed with **dil. H_2SO_4** to remove any rust, scale or dust present on the surface (pickling)

- It is treated with a mixture of aqueous solution of **$ZnCl_2$ and NH_4Cl** which acts as flux which prevents oxidation and then dried

- Finally it is dipped in **molten zinc** at 425-430^o C

- **Excess zinc** present on iron sheet is removed by passing through hot rollers

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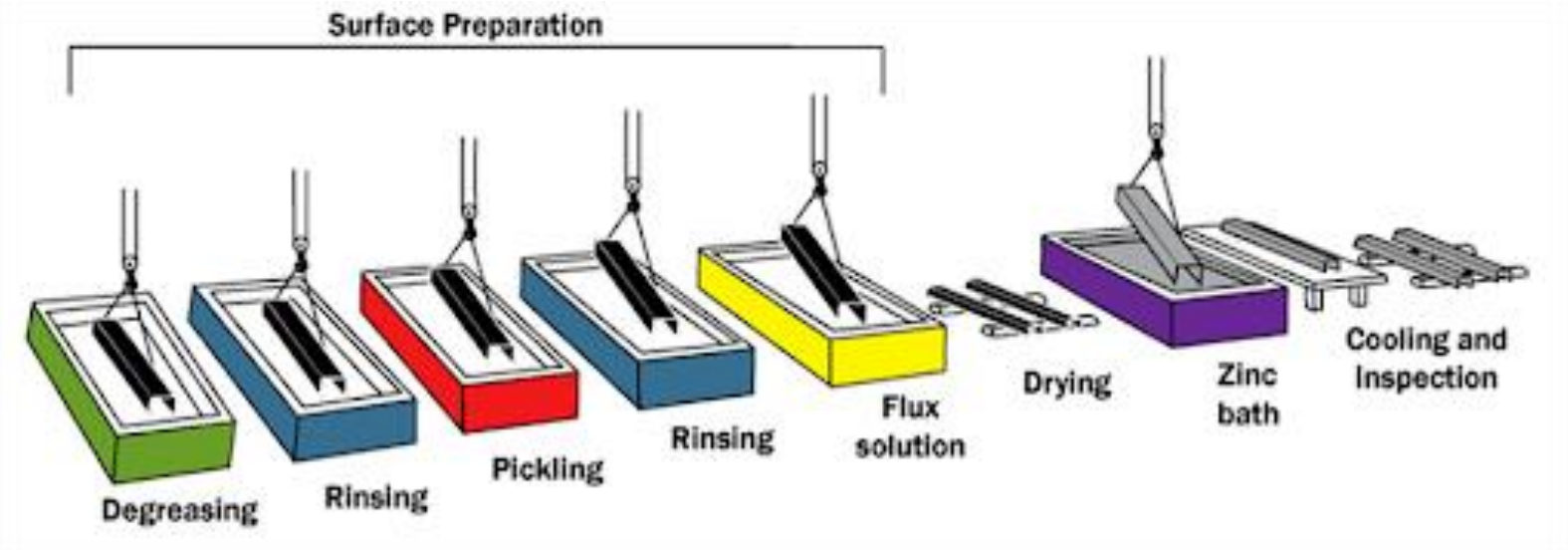
Process of Galvanisation



Source:http://www.lightsoftuscany.com/faq-page/faq-galvanization.html

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Application:

Galvanization of iron is carried out to produce roofing sheets, fencing wire, buckets, bolts, nuts, pipes etc

Advantage:

Even if the Zn coating peels off or there are gaps at some places, the **base metal (Fe) does not get corroded** because the base metal acts as cathode

Disadvantage:

Galvanized articles are **not used for preparing and storing food** because **zinc dissolves in dilute acids** producing toxic zinc compounds

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Cathodic metal coating:

Coating metal is **less active** with respect to the base metal

Base metal should be **completely covered** and there should not be any gaps in the coating
If some part of the base metal is left uncovered, then it undergoes more **intense pitting corrosion** due to formation of small anodic and large cathodic area

e.g.,Coating of Sn or Ni metal over iron

THANK YOU

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