

# CORROSION OF METALS

WHAT IS CORROSION

WHY DOES IT HAPPEN

HOW DOES IT HAPPEN

# WHAT IS IT ?

- MAY PEOPLE SAY KE GO RUSA
- SOME SAY IT IS WHEN SHINING METALS LOSE THEIR COLOURS
- BUT SCIENTIFICALLY, IT REFERS TO A **CHEMICAL REACTION** BETWEEN A METAL AND SOMETHING IN THE ENVIRONMENT( chemicals, water , air and sea salt)
- IT MEANS WEARING AWAY OF METALS THAT OCCUR FROM THEIR SURFACE UNTIL THEY ARE FINISHED OR DESTROYED

# HOW DOES IT HAPPEN /OCCUR

- **ELECTROLYSIS AND CORROSION**

- CORROSION IS AN **ELECTROCHEMICAL** PROCESS BY ORIGIN
- THIS MEANS THAT MATERIALS (STEEL) ARE EXPOSED TO WATER .
- THEN, THEY LOSE **ELECTRONS** AND BECOME POSITIVELY CHARGED **IONS**
- AN **IMBALANCE** OF CHARGES IS CREATED
- THIS IMBALANCE , EFFECTIVELY FORM AN **ELECTRIC CIRCUIT** WHICH IS SOMETIMES REFERRED TO AS **CORROSION CELL**
- THIS IS CALLED ELECTROLYSIS

# WHY DO METALS CORRODE OR GET RUST

- EXPOSURE :
- AS METALS ARE MOST OF THE TIME EXPOSED TO : **WATER, AIR AND CHEMICALS** THERE IS A LOT OF CHEMICAL REACTION THAT HAPPENS EVEN THOUGH IT IS NOT VISIBLE TO A NAKED EYE .  
THIS, CHEMICAL REACTION RUNS THROUGH THE METAL UNTIL IT IS WEAK OR COMPLETELY DESTROYED.  
THEREFORE IT IS DANGEROUS AS IT AFFECT THE QUALITY OF METALS

# SOME RELEVANT TERMINOLOGIES

- ELECTROLYTE: A PASSAGE /MATERIAL THAT ALLOW ELECTRONS TO PASS THROUGH
- ELECTRONS: SMALL PIECE OF MATTER THAT IS NEGATIVELY CHARGED
- ANODE(ref.p220) NEGATIVELY CHARGED PART OF THE BATTERY
- CATHODE(REF.P.221) POSITIVELYCHARGED PIECE OF A BATTERY.
- POTENTIAL DIFFERENCE: DIFFERENCE IN POTENTIAL ENERGY BETWEEN TWO POINTS.

# HOW DO METALS RUST

- IT ALL COME TO POTENTIAL DIFFERENCES (ref. to fig. 4.1, p. 114)
- THAT IS **IRON** HAS THE POTENTIAL OF -0,44 V AND **OXYGEN**(in water) HAS THE POTENTIAL OF +1,23 V.
- GIVEN THESE NUMBERS IT MEANS THAT IRON WILL EASILY GIVE AWAY SOME OF ITS ELECTRONS WHILE OXYGEN WILL NOT GIVE AWAY ELECTRONS THAT EASILY.
- THUS, IF YOU PUT A PIECE OF STEEL(IRON) IN THE WATER , THE PART THAT IS IN CONTACT WITH WATER WILL RUST.....
- READ FROM PAGE 114 THE LAST PARAGRAPH

# THE EFFECTS OF ACID AND ALKALIS ON CORROSION

- THE LIMITS OF THE GALVANIC SERIES
- PLEASE READ THIS ON YOUR OWN FOR BETTER UNDERSTANDING AND MORE INSIGHT!!!!!!
- PROPERTIES OF DIFFERENT TYPES OF CORROSION RESISTANT STEEL
- PLEASE CLASS READ THIS OWN YOUR OWN FOR BETTER UNDERSTANDING AND MORE INSIGHT!!!!!!

# SOLDERING, BRAZING AND WELDING

- SOLDERING :
- IT IS JOINING OF TWO METALS BY MELTING THE THIRD ONE
- BRAZING :
- IT ALSO REFERS TO JOINING OF TWO METAL BY MELTING THE THIRD ONE
- **PLEASE NOTE:**
- THE DIFFERENCE BETWEEN THESE TWO PROCESSES IS HIGH TEMPERATURES



# COMBATING CORROSION

- COMBAT MEANS TO PROTECT OR TO PREVENT .
- THEREFORE IN THIS INSTANCE IT MEANS WAYS OR METHODS THAT CAN BE USED TO PREVENT OR PROTECT STEEL FROM CORROSION
- THERE ARE ALMOST SIX WAYS THAT CAN BE USED TO PREVENT CORROSION IN METALS OR STEEL.

INSULATION AND  
ENCAPSULATION

DRAINAGE  
DESIGN

PAINTING

INHERENT  
CORROSION  
RESISTANT

PROTECTING STEEL  
FROM CORROSION

ELECTROPLATING

HOT DIP  
GALVANISING

# HOW IS THE PROCESS DONE

- DRAINAGE DESIGN: WATER DRAINS AWAY EASILY FROM STEEL
- PAINTING : APPLY PAINT ON STEEL TO PREVENT CORROSION
- ELECTROPLATING: THE MATERIAL IS SUBMERGED INTO A SOLUTION OF COATING THAT HAS ELECTRIC CURRENT. FIG .4.12
- HOT DIP GALVANISING: STEEL IS IMMENSE IN A VERY HOT MOLTEN(ZINC)PP. 124,127

# PROCESS CONTINUED

- INHERENT CORROSION RESISTANCE: MATERIAL USED HAS THE ABILITY TO RESIST CORROSION BY DESIGN
- INSULATION AND ENCAPSULATION: THE MATERIAL IS LAYERED OR COVERED WITH A LAYER OF SOME KIND SO THAT IT CAN RESIST RUSTING
- PLEASE MAKE YOURSELF A BIG FAVOUR AND READ THIS CHAPTER AGAIN ON YOUR OWN!!!!

# SOLDERING, BRAZING AND WELDING.....

- PRACTICAL OBSERVATION AND ORIENTATION IN THE WORKSHOP
- **SOLDERING**: JOINING TWO PIECES OF METALS BY MELTING THE THIRD ONE INTO THE JOINT.
- **BRAZING**: JOINING TWO