

detailed description in vivid colours.

Note: Based on minimum order quantity conditions, Charts can be customized to your requirements in terms of CONTENT, LANGUAGE, SIZE, etc. Please write back to us for discussion.

A. Charts, Soaps and Detergents

B. Charts, Copper Metallurgy

SOAPS
Soaps are salt or ammonium salts of long chain fatty acids, i.e. stearic, oleic and palmitic acids. Soaps containing sodium salts are formed by heating fat with an aqueous sodium hydroxide solution. This process is called saponification.

$$CH_3-(CH_2)_{n-1}-COOH + NaOH \rightarrow CH_3-(CH_2)_{n-1}-COONa + CH_2-OH$$

DETERGENTS
Cleaning agents which have all properties of soap, but actually do not contain any soap.

Anionic detergents: Sodium salts of sulphonated long-chain fatty acids. Example: $CH_3(CH_2)_{10}SO_3Na$ (Sodium lauryl sulphate).

Cationic detergents: Quaternary ammonium salts of amines with sulphonic acid, long-chain fatty acids, phosphate, phosphate, phosphate, phosphate.

Non-ionic Detergents: Free after ethox. alkyl salts with sulphonic acid, long-chain fatty acids, phosphate, phosphate, phosphate, phosphate.

CLEANSING ACTION
1. Soap increases wettability of water by lowering the surface tension of the liquid between the water and the fat.
2. Hotter water helps to provide for greater molecular solubility in water.
3. It hot they trap the grease in suspension so that it can be rinsed away.

PROBLEM WITH HARD WATER
Hard water contains solution of magnesium salts. These replace the sodium of the water-soluble head of soap molecules forming insoluble soap.
Sulphur represents barrier in the water-loving head of detergent molecules. This soap coating and magnesium forming it is a synthetic soapless detergent that do not form insoluble hard water.

$$2C_{17}H_{33}O_2Na + CaCl_2 \rightarrow 2NaCl + (C_{17}H_{33}O_2)_2Ca$$

Soap head **Detergent head**

IMPORTANT ORES OF COPPER
1. Copper pyrite or chalcopyrite ($CuFeS_2$),
2. Chalcocite or copper glance (Cu_2S),
3. Malachite green ($CuCO_3 \cdot Cu(OH)_2$).

CONCENTRATION
The finely crushed ore is concentrated by froth-flotation process.

ROASTING
Sulphide is oxidized to SO_2 and sulphate and sulphide are removed as soluble oxides. The following reactions take place:
 $2CuFeS_2 + 7O_2 \rightarrow 2Cu_2O + 2FeO + 4SO_2$
 $2Cu_2O + 3O_2 \rightarrow 4CuO$
Copper sulphide and ferrous sulphide are further oxidized as follows:
 $2CuS + 3O_2 \rightarrow 2Cu_2O + 2SO_2$
 $2FeS + 3O_2 \rightarrow 2FeO + 2SO_2$

SMELTING
The roasted ore is mixed with silica and silica (acid) SiO_2 and is introduced into a blast furnace. The hot air is blown and FeO reacts with silica to form silicate ($FeSiO_3$).
 $FeO + SiO_2 \rightarrow FeSiO_3$
 $Cu_2O + FeO \rightarrow Cu_2S + FeO$
 $FeSiO_3$ (slag) floats over the molten mass of copper.

SCUMMING
Copper metal is extracted from molten matte through leaching. The matte is introduced into leach tank where it is converted into blue liquor. The air is blown through the blue liquor. Most of air converts Cu_2S partly into Cu_2O which reacts with remaining Cu_2S to give molten copper.
 $2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$
 $2Cu_2O + Cu_2S \rightarrow 3Cu + SO_2$

ELECTROREFINING OF COPPER
The copper so obtained is called "Blister Copper" as it contains 10-15% oxygen bubbles.
ANODE **CATHODE**
Impure copper Pure copper
Copper ions Copper ions
Copper Copper

USES OF COPPER
Computer Chip, Mobile Wiring, Copper Tubing & Fitting, Copper Coins, Hoses.

C. Charts, Cement and Concrete

D. Charts, Extraction of Zinc

Cement and Concrete

Preparing Portland Cement

The limestone (provides calcium oxide) and Clay (provides silica, alumina and ferric oxide) are ground, mixed with water and carbonated. Next the material is burned to a large rotary kiln at 2500°F. The clinker so formed is then cooled and ground to a fine powder in a ball mill. Gypsum (CaSO₄·2H₂O) is added during the grinding process to delay setting time of cement. Finally the powdered cement is packed in water-proof bags.

Composition of Cement

CaO	65 - 75%
SiO ₂	20 - 25%
Al ₂ O ₃	5 - 10%
Fe ₂ O ₃	2 - 3%

Concrete

Concrete is a composite material composed of coarse aggregate (sand and gravel) and water. It is prepared by mixing concrete with aggregate.

When water is mixed into cement, hydration occurs. The hydrated cement surrounds the aggregate particles and binds them to provide maximum strength.

Types of Reinforced Concrete Foundations

Refr. Foundations

Pile Foundations

House Foundations

Column Foundations

Applications of Cement & Concrete

Precast Concrete Pipes

Concrete Road

Masonry Wall

Bridge

Extraction of Zinc

Worldwide, 80% of the zinc is mined from sulphide ore deposits mainly ZnS. After grinding the ore, float flotation is used to get an ore concentrate. Lead is simultaneously extracted along with zinc.

Zinc is Extracted Using Two Processes

- Roasting**, which involves the preparation of zinc oxide from ore concentrates.
- Pyrometallurgical Process**, which further reduces zinc oxide with carbon or carbon monoxide at 950 °C into the metal, which is distilled as zinc vapour. The zinc vapour is collected in a condenser.

$$ZnS + 3O_2 \rightarrow ZnO + 2SO_2$$

$$ZnO + C \rightarrow Zn + CO$$

$$ZnO + 2CO \rightarrow Zn + 2CO_2$$

Final products: Impure lead containing impurities of gold, silver, tin, bismuth and cadmium is separated for electrolytic process for lead refining.

E. Charts, Alkynes

F. Charts, Alkenes

Alkynes

Alkynes are unsaturated hydrocarbons containing at least one triple bond.

Functional Group: $\text{—C}\equiv\text{C—}$

General Formula: $\text{C}_n\text{H}_{2n-2}$

3-D Structure of Simplest Alkyne (Ethyne/Acetylene):

NOMENCLATURE: In common system, alkynes are named as derivatives of acetylene. In IUPAC system they are named as derivatives of corresponding alkenes replacing 'ene' by suffix 'yne'. The position of the triple bond is indicated by the first triply bonded carbon.

Value of n	Mol. Formula	Structure	Common Name	IUPAC Name
2	C ₂ H ₂	H—C≡C—H	Acetylene	Ethyne
3	C ₃ H ₄	CH ₃ —C≡C—H	Methylacetylene	Propyne
4	C ₄ H ₆	CH ₃ —CH ₂ —C≡C—H	Ethylacetylene	But-1-yne

Preparation

- From Calcium Carbide:** Ethyne is prepared by heating calcium carbide with water.

$$\text{CaC}_2 + 2\text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{C}_2\text{H}_2$$
- From Vicinal Dihalides:**

$$\text{H}_2\text{C}=\text{CH}_2 + \text{KOH} \xrightarrow{\text{Br}_2} \text{H}_2\text{C}(\text{Br})-\text{CH}_2(\text{Br}) \xrightarrow{\text{KOH}} \text{H}_2\text{C}=\text{CH}_2$$

Applications of Alkynes

- Use-1: Alkynes are used as a starting material for drugs and dyes.
- Use-2: Acetylene is used in welding of steel and metal.
- Use-3: Used as starting material for manufacturing large number of organic compounds such as chloroalkenes, vinyl chloride and acrylic polymers.

Alkenes

Alkenes are unsaturated hydrocarbons containing at least one double bond. They are also known as olefins (oil forming).

General Formula: C_nH_{2n} (n ≥ 2)

Functional group: >C=C<

Ethene is the simplest alkene commonly known as ethylene.

Molecular Formula	Structure	IUPAC Name
C ₂ H ₄	CH ₂ =CH ₂	Ethene
C ₃ H ₆	CH ₂ =CH—CH ₃	Propene
C ₄ H ₈	CH ₂ =CH—CH ₂ —CH ₃	But-1-ene
C ₄ H ₈	CH ₃ —CH=CH—CH ₃	But-2-ene
C ₄ H ₈	CH ₂ =CH—CH=CH ₂	Buta-1,3-diene
C ₄ H ₈	CH ₃ —C(CH ₃)=CH ₂	2-Methylprop-1-ene

- From alkyl halide reaction of alkyne:**

$$\text{CH}_3\text{—CH}_2\text{—I} \xrightarrow{\text{KOH}} \text{CH}_2=\text{CH}_2$$
- Dehydrohalogenation:**

$$\text{CH}_3\text{—CH}_2\text{—X} \xrightarrow{\text{KOH}} \text{CH}_2=\text{CH}_2$$
- From alkyl halide reaction of alcohols:**

$$\text{CH}_3\text{—CH}_2\text{—OH} \xrightarrow{\text{P}_2\text{O}_5} \text{CH}_2=\text{CH}_2 + \text{H}_2\text{O}$$
- Dehalogenation of vicinal dihalides:**

$$\text{CH}_2(\text{Br})\text{—CH}_2(\text{Br}) + 2\text{Zn} \rightarrow \text{CH}_2=\text{CH}_2 + 2\text{ZnBr}_2$$

Application of Alkenes

- Utensils
- Squash bottles, Water bottles
- Egg cartons, disposable plastic glass
- PVC insulation tapes
- Dustbin
- Buckets

G. Charts, Alcohols

H. Charts, Alkanes

Alcohols

Alcohols are organic compounds in which a **hydroxyl group (-OH)** is bound to a carbon atom of an alkyl or substituted alkyl group.
In common terms alcohol refers to ethanol found in alcoholic beverages.

General Formula: C_nH_{2n+2}O

Nomenclature: Alcohols are named by substituting 'ol' of alkane with the suffix 'ol'. Position of substituents is indicated by numerals.

Common and IUPAC Names of Some Alcohols

Formula	Common Name	IUPAC Name
CH ₃ -OH	Methyl alcohol	Methanol
CH ₃ -CH ₂ -CH ₂ -OH	n-Propyl alcohol	Propan-1-ol
CH ₃ -CH(OH)-CH ₃	Isopropyl alcohol	Propan-2-ol
CH ₃ -CH ₂ -CH ₂ -CH ₂ -OH	n-Butyl alcohol	Butan-1-ol
CH ₃ -C(OH)(CH ₃)-CH ₂ -OH	tert-Butyl alcohol	2-Methylpropan-2-ol

PREPARATION

- From Alkyl Halides:** Reaction of alkyl halides with aqueous sodium hydroxide yields alcohols.
CH3CH2CH2Br + NaOH -> CH3CH2CH2OH + NaBr
- Reduction of Aldehydes and Ketones:**
CHO + H2 -> CH2OH
CO + H2 -> CH2OH
- Reduction of Carboxylic Acids:**
COOH + H2 -> CH2OH

USES OF ALCOHOL (ETHANOL)

- In Alcoholic Beverages (Wine, Beer, Spirit)
- In Digestive Syrups
- In Cough Syrups
- In Antiseptic Lotions

Alkanes

ALKANES are the chemical compounds that consist only of the elements carbon (C) and hydrogen (H). They are also called saturated hydrocarbons because the carbon atoms in them are linked by single bonds.

General Formula: C_nH_{2n+2}

Methane Molecule: Methane is the simplest alkane. It has a tetrahedral structure with all H-C-H bond angles of 109.5°.

NOMENCLATURE: Names of alkane series of hydrocarbons end in 'ane'. The prefix tells the number of carbon atoms in the chain.

Details of Early Members of Alkane Series

Name	Molecular Formula	No. of Carbon Atoms	Boiling Point (°C)	Physical State at Room Temp.
Methane	CH ₄	1	-164	gas
Ethane	C ₂ H ₆	2	-87	gas
Propane	C ₃ H ₈	3	-42	gas
Butane	C ₄ H ₁₀	4	0	gas
Pentane	C ₅ H ₁₂	5	36	liquid

Applications of Alkanes:

- Petroleum Refinery
- Petrol Pump
- Vehicle Run on Petrol
- LPG
- CNG-Station
- CNG Bus
- Cooking Gas

I. Charts, Electroplating and Corrosion

J. Charts, Aluminium Metallurgy

Electroplating and Corrosion

Electroplating is the coating of an electrically conductive object with a layer of metal using electrical current. The result is a thin, smooth, even coat of metal on the object. The layer of deposited metal is usually from 5 × 10⁻⁴ cm to 1 × 10⁻³ cm thick.

Basic rules for electroplating an object with metal M:

- The object must be made the cathode.
- The electrolyte must be a solution of a salt of metal M.
- The anode is made of a strip of metal M.

EXAMPLES OF CORROSION:

- Rusting of iron
- Silver articles become black when exposed to air
- Green coating on copper vessels

Mechanism of Rusting:

Due to thermal oxidation, Fe is oxidized by oxygen in the air to form iron(III) oxide (rust):
4Fe + 3O2 -> 2Fe2O3

Factors Involved in Rusting:

- Presence of moisture
- Presence of air
- Presence of electrolyte
- Presence of impurities

Aluminium Metallurgy

Aluminium extraction is done in two phases: Bayer's process of refining bauxite ore to obtain alumina & Hall-Heroult process of smelting the alumina to get pure aluminium.

BAYER'S PROCESS

- CRUSHING:** Bauxite ore is mechanically crushed.
- LEACHING:** The ore is treated in 20-30% NaOH. The insoluble and soluble oxides as aluminium hydroxide impurities are dissolved in the hydroxide solution.
Al2O3 + 2OH- -> 2[Al(OH)4]-
- PRECIPITATION:** Seed crystals of alumina hydrate are added to filter. The dissolved aluminium hydroxide precipitates out as white fluffy solid.
- CLARIFICATION:** The full solution (aluminate) is filtered and then treated with Ca(OH)₂.
- DRYING:** Wash residue is washed in 200°C, the aluminium hydroxide decomposes to alumina.
Al(OH)3 -> Al2O3 + 3H2O

HALL-HEROULT PROCESS

Purified Al₂O₃ is mixed with Na₂CO₃ (Cryolite) and CaF₂ to lower the melting point.

The overall reaction of the process is as:
2Al2O3 + 3C -> 4Al + 3CO2

Uses of Aluminium:

- Packaging
- Aircraft Industry
- Construction
- Utensils

K. Charts, Plastics

L. Charts, Synthetic Fibres

Plastics

Thermoplastics

Arrangement of molecular units is linear or slightly branched.

PVC (Polyvinyl chloride)

Prepared by polymerization of vinyl chloride

$$n \text{CH}_2=\text{CHCl} \rightarrow \text{---}[\text{CH}_2-\text{CHCl}]_n\text{---}$$

Applications:

Polythene

LDPE
Prepared by free radical polymerization of ethene

$$n \text{CH}_2=\text{CH}_2 \rightarrow \text{---}[\text{CH}_2-\text{CH}_2]_n\text{---}$$

Applications:

HDP
Prepared by free radical polymerization of ethene

$$n \text{CH}_2=\text{CH}_2 \rightarrow \text{---}[\text{CH}_2-\text{CH}_2]_n\text{---}$$

Applications:

Thermosetting plastics

Arrangement of molecular units is cross-linked or heavily branched.

Bakelite

Prepared by condensation polymerization of phenol and formaldehyde

$$n \text{C}_6\text{H}_5\text{OH} + n \text{HCHO} \rightarrow \text{---}[\text{C}_6\text{H}_4\text{---CH}_2\text{---}]_n\text{---}$$

Applications:

Melamine

Prepared by condensation polymerization of melamine and formaldehyde

$$3n \text{C}_3\text{H}_7\text{N}_3 + 6n \text{HCHO} \rightarrow \text{---}[\text{C}_3\text{H}_6\text{N}_4]_n\text{---}$$

Applications:

Synthetic Fibres

Synthetic fibre is a chain of molecules known as monomers which form polymers.

Characteristics

1. Dry up quickly
2. Durable
3. Less expensive
4. Easy to maintain

Rayon

Obtained by chemical treatment of wood pulp. Similar to that of silk (also called artificial silk).

When mixed with cotton, it is used to make bed sheets.

When mixed with wool, it is used to make coats.

Polyester

Polyester Fabrics
(a) do not get wrinkled easily
(b) are crisp
(c) are easy to wash

Example - Terylene

Prepared by heating a mixture of ethylene glycol and terephthalic acid at 420 to 480 K in presence of zinc oxide-zinc metal catalyst.

$$n \text{HOCH}_2\text{CH}_2\text{OH} + n \text{HOOC}-\text{C}_6\text{H}_4-\text{COOH} \rightarrow \text{---}[\text{OCH}_2\text{CH}_2\text{OOC}-\text{C}_6\text{H}_4-\text{CO}]_n\text{---}$$

Applications:

Nylon

Strong, elastic, light, lustrous and easy to wash.

Nylon 6,6
Prepared by condensation polymerization of hexamethylenediamine with adipic acid under high pressure & temperature.

$$n \text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2 + n \text{HOOC}(\text{CH}_2)_4\text{COOH} \rightarrow \text{---}[\text{NH}(\text{CH}_2)_6\text{NHCO}(\text{CH}_2)_4\text{CO}]_n\text{---}$$

Applications:

Nylon 6

Prepared by condensation polymerization of hexamethylenediamine with caproic acid at a high pressure.

$$n \text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2 + n \text{HOOC}(\text{CH}_2)_5\text{COOH} \rightarrow \text{---}[\text{NH}(\text{CH}_2)_6\text{NHCO}(\text{CH}_2)_5\text{CO}]_n\text{---}$$

Applications:

Acrylic

Resembles natural wool

Example: Polyacrylonitrile
Prepared by addition polymerisation of acrylonitrile in presence of peroxide catalyst.

$$n \text{CH}_2=\text{CHCN} \rightarrow \text{---}[\text{CH}_2-\text{CHCN}]_n\text{---}$$

Applications:

M. Charts, Organic Acids

N. Charts, Esters

Organic Acids

Organic acids are organic compounds with acidic properties. Most common organic acids are carboxylic acids having COOH group.

NOMENCLATURE

Common names end with the suffix **-oic acid** and have been derived from Latin or Greek names of their natural sources. Example - Formic acid, Lactic acid, Acetic acid, Citric acid and Oxalic acid.

In IUPAC system aliphatic carboxylic acids are named by replacing the ending **-e** in the name of the corresponding alkane with **-oic acid**.

Structure	Molecular Formula	Common Name	IUPAC Name
	CH ₂ OOH	Formic Acid	Methanoic Acid
	CH ₃ COOH	Acetic Acid	Ethanoic Acid
	C ₂ H ₅ COOH	Propionic Acid	Propanoic Acid
	C ₆ H ₅ COOH	Benzocarboxylic Acid	Benzoic Acid

STRUCTURE OF CARBOXYL GROUP

Applications of Organic Acids

Organic acids are used in various industries like food, medicine, etc.

Organic acids are used in various industries like food, medicine, etc.

Esters

Esters are sweet smelling chemical compounds derived from an oxoacid (one containing an oxo group, C=O) and a hydroxyl compound such as an alcohol or phenol. Most common oxoacids used to derive esters are carboxylic acids (R-COOH).

GENERAL FORMULA

$$\begin{matrix} \text{O} \\ || \\ \text{R}-\text{C}-\text{OR}' \end{matrix}$$

(R and R' are any alkyl or aryl group)

NOMENCLATURE

1. Name the alkyl from the alcohol - O-
2. Name the acid with the C=O with -ate

Example:

Methyl ethanoate (IUPAC)
Methyl acetate (common)

NAME	FORMULA	ODOR
Ethyl methanoate	HOOCCH ₂ CH ₂ CH ₃	Rose-like
Ethyl propanoate	CH ₃ CH ₂ COOCH ₂ CH ₃	Piney
Ethyl butanoate	CH ₃ CH ₂ CH ₂ COOCH ₂ CH ₃	Pineapple
Ethyl pentanoate	CH ₃ CH ₂ CH ₂ CH ₂ COOCH ₂ CH ₃	Coconut
Octyl ethanoate	CH ₃ COO(CH ₂) ₇ CH ₃	Orange

PREPARATION

Fischer esterification - Carboxylic acids react with alcohols in presence of dilute drops of concentrated sulphuric acid as catalyst.

$$\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$$

ethanoic acid + ethanol → ethyl ethanoate + water

Applications of Esters

Esters are used for making perfumes.

Esters react with sodium hydroxide to form soaps (saponification).

$$\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{C}_2\text{H}_5\text{OH}$$

Plexiglass (a transparent plastic) is a long chain ester.

Esters are used in ice-creams and cold drinks.

Esters give flowers and fruits their pleasant fragrances and flavours.

Dacron, a long chain ester is used for making fabrics.

O. Charts, Blast Furnace

P. Charts, Manufacture of Glass

BLAST FURNACE (EXTRACTION OF IRON)

THE MAIN ORE OF IRON IS HEMATITE (Fe₂O₃). THE IRON IS OBTAINED BY REDUCTION IN BLAST FURNACE. THE FURNACE IS LOADED WITH THE CHARGE CONSISTING OF IRON ORE, COKE AND LIMESTONE. THE CHARGE IS SINTERED TO MAKE SURE THE ACIDIC MIX WELLS. SLATS OF HOT AIR ARE SENT IN THROUGH HOLES NEAR THE BOTTOM OF THE FURNACE.

Following are the important reactions occurring within the Blast Furnace:

- At 500°C: $3Fe_2O_3 + CO \rightarrow 2Fe_3O_4 + CO_2$
- At 500°C: $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$
- At 700°C: $FeO + CO \rightarrow Fe + CO_2$
- At 800°C: $CO + C \rightarrow 3CO$
- At 900°C: $C + O \rightarrow CO$
- At 1000°C: $CO + C \rightarrow CO$

One of the major impurities in iron ore is silicic acid (SiO₂). The silicic acid is removed by the formation of silicic acid from the iron ore.

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Manufacture of Glass

Manufacturing of Standard Soda-Lime-Silica Glass

Raw materials: Soda ash (Sodium carbonate), Limestone (Calcium carbonate), Silica sand, Dolomite, and other raw materials are fed into the furnace.

The furnace is heated up to 1500°C to melt the raw materials.

Glass Moulding

To make glassware, a lump of molten glass is dropped into a mould. Compressed air forces the molten glass to take the shape of the mould. The glass sticks to the sides of the mould and acquires its shape. This is then transferred to another mould assembly given by the customer.

A gob is dropped into the mould. The heated glass sticks to the sides of the mould. Compressed air forces the glass into the shape of the mould. The glass is cooled slowly so that it does not break. A continuous sheet of glass is cut with a cooling unit.

Raw Materials

Sand	72.8%
Soda Ash	13.8%
Limestone	8.4%
Dolomite	4.8%
Alumina	2.8%

Raw materials are introduced into the furnace. The temperature around 1400°C melts the raw materials which then combine to form molten glass. This molten glass is made to float on a stream of moving water. As the molten glass is being fed, oxygen flow atmosphere is provided to prevent the formation of metal stick. The glass is cooled through rollers which take it through different temperatures zones until cooling is finished.

Coloured Glass

Cobalt Glass, Chrome Glass, Olive Green, Red Glass.

Lead Crystal Glass

Laminated Glass

Polycarbonate, Glass, Interlayer, Glass, Interlayer, Polycarbonate.

Photochromatic Glass

Photochromatic glass changes color when exposed to UV light.

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MANUFACTURE OF STEEL

THE IRON PRODUCED BY THE BLAST FURNACE IS KNOWN AS PIG IRON. MOST OF THE PIG IRON PRODUCED IS USED TO MAKE STEEL.

BASIC OXYGEN PROCESS

Raw materials: Molten iron, scrap metal, and other raw materials are fed into the furnace. The furnace is heated up to 1600°C to melt the raw materials.

ELECTRIC ARC PROCESS

An alternative process, known as the Electric Arc Furnace, is used to make steel from scrap metal. Currently about 28% of the world's steel is produced by this method.

Process	Temperature (°C)	Capacity (t)	Production (t/year)
Blast Furnace	1500	1000	1000000
Basic Oxygen Furnace	1600	1000	1000000
Electric Arc Furnace	1600	1000	1000000

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