

HAEMATINICS

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DEFINITION

The agents used for formation of blood to treat various types of anaemia's.

These include:

Iron, Vitamin B₁₂ and Folic Acid.

ANAEMIA

- Decreased capacity of RBCs to carry oxygen to tissues.
- Anaemia occurs when the balance between production and destruction of RBCs is disturbed by:

Blood loss (acute or chronic)

Impaired red cell formation due to:

- Deficiency of essential factors, i.e. iron, vitamin B₁₂, folic acid.
- Bone marrow depression (hypoplastic anaemia), erythropoietin deficiency.

Increased destruction of RBCs (haemolytic anaemia)

- Iron deficiency occurs due to:

Malnutrition

Loss

Congenital atransferrinemia (inability to release iron from transferrin)

HAEMATOPOIESIS

- The production of circulating erythrocytes, leukocytes and platelets from undifferentiated stem cells, is called haematopoiesis.
 - It requires:
 - Iron –for Hb formation
 - Vitamin B₁₂
 - Folic acid
 - Hematopoietic growth factors

Proteins that regulate the proliferation and differentiation of hematopoietic cells



IMPORTANCE OF IRON IN BODY-

Iron is considered to be one of the essential constituent of the body. Its usual contents are about 45mg/kg body weight.

The total body content of iron is estimated to be about 3-4g.

The main portion of body iron (70%) occurs in haemoglobin and myoglobin.

The remaining portion is in the form of storage iron, transport iron and enzyme iron.

Iron plays a very vital role in body functions. It is an essential constituent of blood system and tissues where it plays a very specific role.

Iron is generally associated with the types of proteins (1) hemoproteins (2) iron storage or transport proteins

DIETARY SOURCES OF IRON

Rich : Liver, egg yolk, oyster, dry beans, dry fruits, wheat germ, yeast.

Medium: Meat, chicken, fish, spinach, banana, apple.

Poor : Milk and its products, root vegetables.

TREATMENT OF IRON DEFICIENCY

Oral preparations can be used. Oral preparation is present in the form of salts like: Ferrous gluconate, Ferrous sulphate, Ferrous fumarate.

Parenteral Therapy: Iron dextran, Sodium ferric gluconate complex, Iron sucrose.

Adverse effect of oral iron preparation: Individuals differ in susceptibility like epigastric pain, heartburn, nausea, vomiting, staining of teeth, metallic taste, bloating, colic and

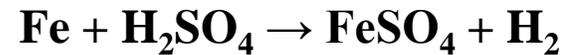
Constipation is more common (believed to be due to astringent action of iron).

Iron (II) sulphate or Ferrous sulfate

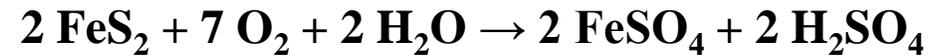
▪ Molecular formula	FeSO₄•7H₂O	
▪ Molar mass	278.02 g/mol	
▪ Synonym	Green vitriol, Iron vitriol, Copperas	

Preparation

-Ferrous sulphate is obtained by dissolving iron in excess of dilute sulphuric acid. After the effervescence ceases, the liquid is filtered, concentrated and cooled. The green crystals formed are separated by filtration at room temp.



- Ferrous sulfate is also prepared commercially by oxidation of pyrite



Properties

Appearance : White crystals (anhydrous); White yellow crystals (monohydrate); Blue green crystals (heptahydrate)

Crystal structure: Orthorhombic (anhydrous); Monoclinic (heptahydrate);

Odor : Odorless

Taste : Astringents and metallic taste

Density: 3.65 g/cm³ (anhydrous); 3 g/cm³ (monohydrate); 1.895 g/cm³ (heptahydrate)

Solubility: Soluble in water, insoluble in alcohol

Assay

1. It is assayed by oxidation-reduction type of reaction using 0.1N potassium permanganate solution in the presence of dilute sulphuric acid.

Accurately weighed about 1g is dissolved in 20ml of dilute sulphuric acid. Then, it is titrated with 0.1N KMnO_4 .

2. Now it is assayed by taking about 1g of accurately weighed sample, then dissolved in about 30ml of water and 20ml of dilute sulphuric acid in a conical flask and finally titrated with standard 0.1M ceric ammonium nitrate taken in the burette, using ferroin sulphate solution as an indicator.

At the end point the red colour gets changed to light blue.

Uses

Ferrous sulfate is a haematinic agents, it is used to treat and prevent iron deficiency anaemia.

Ferrous sulfate was used in the manufacture of inks, most notably iron gall ink

Woodworkers use ferrous sulfate solutions to color maple wood a silvery hue.

In horticulture it is used for treating iron chlorosis.

Ferrous sulfate is sometimes added to the cooling water flowing through the brass tubes of turbine condensers to form a corrosion resistant protective coating.

It is used in gold refining.

Green vitriol is also a useful reagent in the identification of mushrooms.

Dose: 60 mg to 600 mg

Storage: Store in amber color bottle or light resistant container.

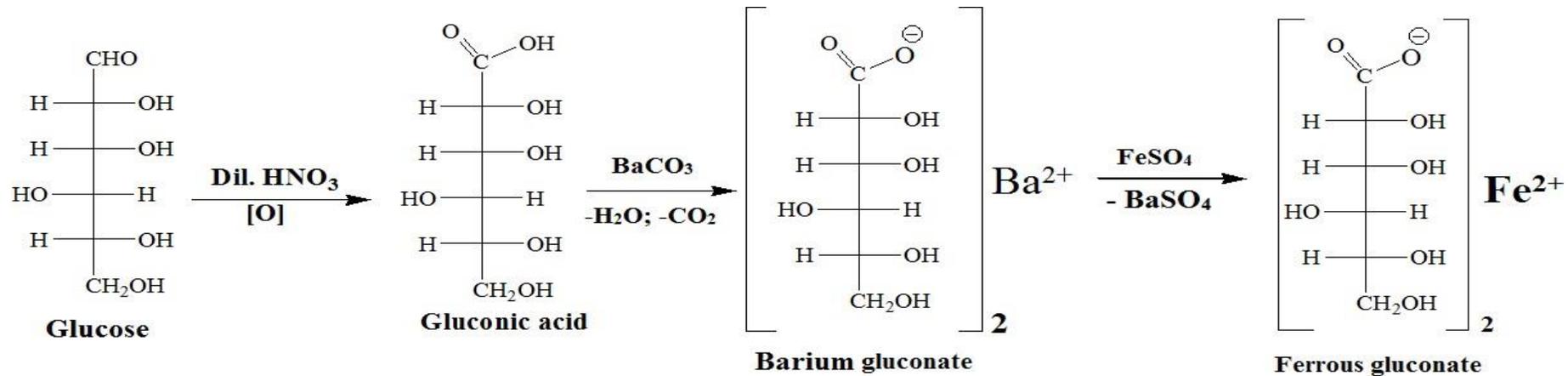
Ferrous gluconate

- **Molecular formula** $\text{C}_{12}\text{H}_{22}\text{FeO}_{14} \cdot 2\text{H}_2\text{O}$
- **Molar mass** **482.2**
- **Synonym** Ferrosi gluconas

Preparation

Gluconic acid is first prepared by oxidation of glucose by dilute nitric acid, and then barium carbonate is added to get barium gluconate.

This is treated with ferrous sulfate which gives ferrous gluconate.



Uses

-Ferrous gluconate is effectively used in the treatment of hypochromic anemia.

Dose:

Men: 8 mg/day;

Women: 18 mg/day;

Pregnant women: 27 mg/day;

Lactating women: 9 mg/day