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**Review Article**

# BLOOD Substitute-Bio Polymer

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## Abstract

oxygen-binding polymer for artificial blood has been made by Lance Twyman and Yi Ge at Sheffield University in 2006.This polymer has iron-centred porphyrin and surrounded by branched polyester chains. It can act as to bind oxygen atoms reversibly. Molecular polymer has molecular weight 37,000D, UV-spectrophotometric techniques have established the oxygen binding potential of porphyrin cored hyper branched polyester(HBP).Artificial blood made up of plastic molecules. It also has longer life. Plastic blood cells can be used as artificial blood when a natural blood supply is running low.

**Keywords:** Statistical Process Control, Tablet Compression Machine, Process Capability, Control Chart.

## INTRODUCTION

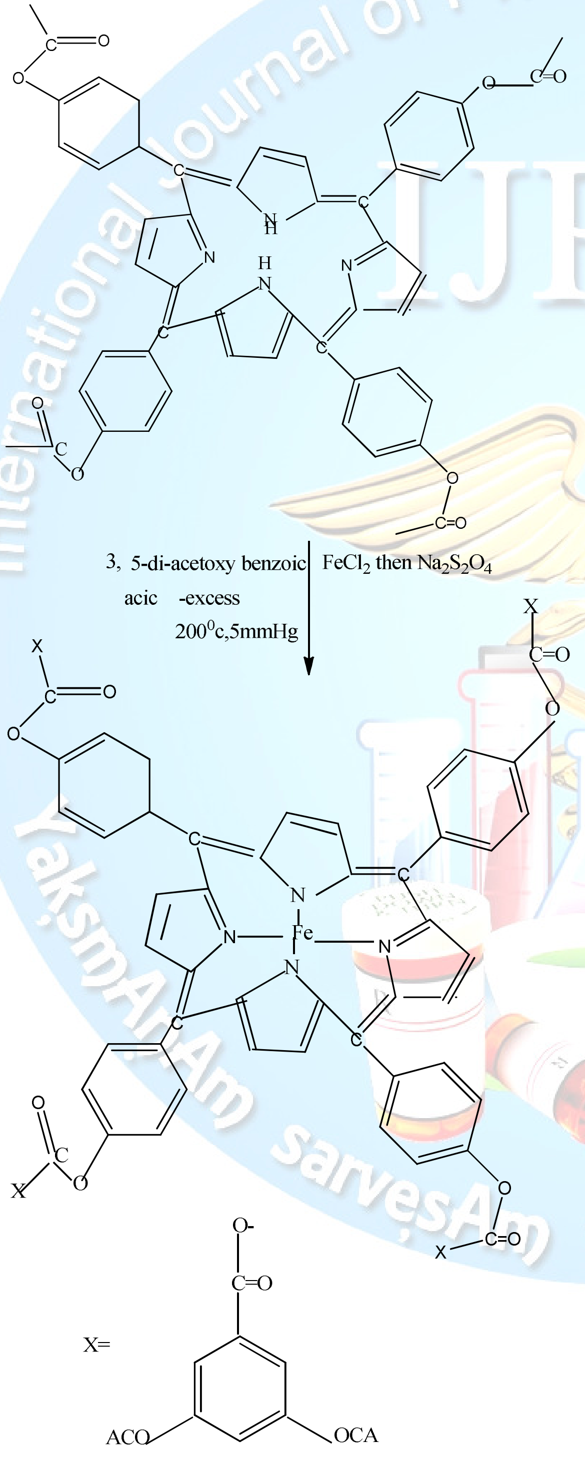
Artificial blood has been made by Lance Twyman and Yi Ge at Sheffield University in 2006.In 1960 Dr.Leland Clark was doing his experiment with a special type of compounds i.e. perflurocarbons for searching the blood substitute.Oxygen has approximately more than100 times greater solubility in perflurocarbon solution than in plasma. Molecular polymer has molecular weight 37,000D,UV-spectrophotometric techniques have established the oxygen binding potential of porphyrin cored hyper branched polyester(HBP).Artificial blood made up of plastic molecules.The use of pluronic-64 as an emulsifying agent for perfluoro carbon enabled production of Fluosol.But Flusosol was present only in low concentration in the emulsion,with the increase of research in emulsion technologies gave important result in the production of polymer which utilize smaller chain per fluorocarbon to more effectively emulsify the perflurocarbons,allowing higher concentrations of active agent in the emulsion and thus higher oxygen carrying capabilities.

**Preparation, Mechanism and structure:**

A Sutiable blood substitute is prepared by emulsification of per fluoro carbon by emulsifying agent.Aporphyrin unitact as an initiator core and incorporate at the centre of a hyperbranched polyester(HBP).A Porphyrin core HBP was synthesized by reacting an excess of the branching monomer,3,5-di-acetoxy benzoic acid(95mol%) with small amount of the core unit tetrakis(4-acetoxy phenyl) porphyrin(5mol%) under reversible transesterification conditions.The polymer is purified and its weight is determined to 37.000 D,a degree of branching is found equal to49%. The level of core incorporation is found to be extremely high, approaching 100%.Fe(lll) is found in standard condition and then reduced to the activeFe(ll) species using $Na_2S_2O_4$ two phase reduction procedure.

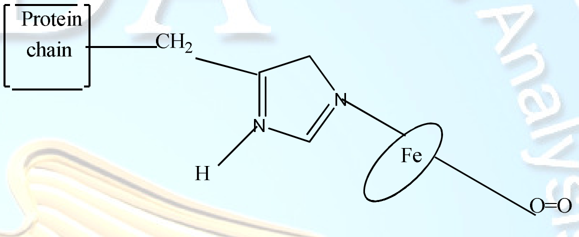
No reduction in molecular weight is confirmed by permeation chromatography(GPC).This indicates the integrity of polymer.UV Photometric techniques is applied to confirm the oxygen binding capability of porphyrin cored HBP.

**UV Spectrometric studies**: THE Fe(II) Coered HBP shows maximum absorption at 435 nm in dichloromethane introducing oxygen into the solution approx 1 minute it is found that absorption maxima shifted to 422nm.Such shift is consistent with an $Fe(II)-O_2$ complex. The UV spectrum is again obtained of uncoUmplexed Fe(II)species to maximum absorption of 435 nm.when oxygen is removed from the solution, by introducing nitrogen for 5 minute in the solution, after prolonged cycles, the peak at 418nm more visible and dominated in the obtained UV spectrum which shows the oxygen is becoming more difficult. The oxidation of the porphyring with in the cluster of HBP is controlled and monitored by taking (II)-$O_2$-complex and observing UV spectrum.



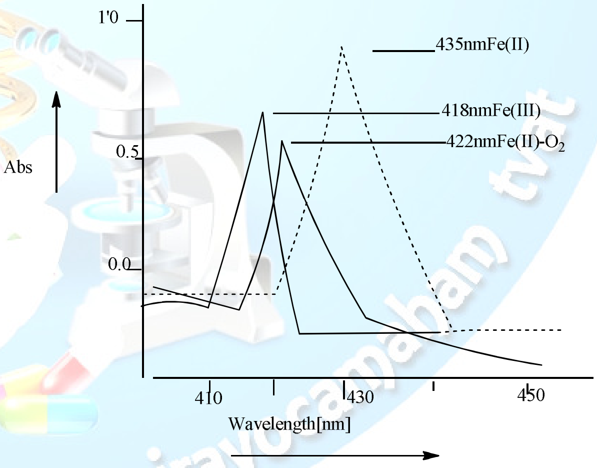
X= **3, 5-di-acetoxy benzoate unit involve in the formation of polymer;** Oxygen binding hyper branched polymer

After 30 minutes the Fe(III) signal was more significant and the remaining Fe(II)-$O_2$ peak more prominent and hard to distinguish from the tail of theFe(III)peak ,from the uv spectrum the conclusion can be drawn how HBP is more efficient for reversibly bind oxygen, with the potential to be applied as future blood substitute product. The $O_2$ binding polymer is not soluble in water hence a system is also developed which is more exciting to prepare hyper branched poly ethylene oxides which is water soluble system.



Heme environment

In this method the anionic polymerisation of the latent AB2monomer glycidiol using a porphyrin tetraphenolate as the initiator, i.e., the core of the polymer.



UV Spectrophotometric graph representing three key species involved in $O_2$ Binding

**Result and Discusion**: The artificial blood is light to carry, unlike blood plasma, does not need to be refrigerated and having longer shelf life. It consists of plastic molecules with an Iron atom core which helps to stimulate the oxygen-carrying haemoglobin in real red blood cells.Pastic blood cells could be used as substitute when the supplies of natural human blood run very low. This product can be stored in easy way than blood hence large quantities could be carried easily by ambulances and the battlefields.

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