Notes on paper chromatography, and Blood transfusion

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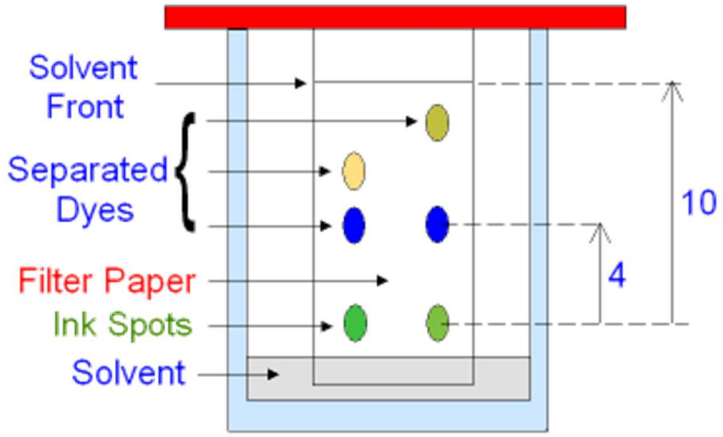
Paper chromatography

Paper Chromatography is a separation technique that is used to separate and identify the components of a mixture. The mixture is put on a filter paper that is placed in a suitable solvent.



As the solvent rises up the filter paper the individual components (dyes) within the green ink spots are separated. Different dyes travel different distances up the paper. The solvent travels furthest up the filter paper leaving a line called the solvent front.

All types paper chromatography employ a mobile phase (eluent-liquid or gas), which is forced through a stationary phase (solid or semi-solid). Mixtures are separated because some components will be more attracted to the stationary phase (and stick to it) while some components will be more attracted to the mobile phase (and travel with it).

Stationary Phase

Paper chromatography uses paper as the stationary phase. The exact type of paper used is important. Filter paper is one of the best types, although paper towels and even newspaper can also be used. Writing paper is coated so that ink does not run and because of this is less satisfactory. Of course, wax paper, not being absorbant, is unsatisfactory.

Mobile Phase

The mobile phase used in this experiment is called "eluting solution" and consists of a mixture containing Ethyl alcohol, Butyl Alcohol, 6 M HCl and acetone. It is introduced at the bottom of the chromatogram and allowed to move upwards by capillary action.

Retention factor (R_f)

The retention factor (R_f) may be defined as the ratio of the distance traveled by the substance to the distance traveled by the solvent.

R_f value is calculated by taking the distance traveled by the substance divided by the distance traveled by the solvent. For example, if a component travelled 4 cm and the solvent travelled 10 cm then Rf=4 ÷ 10 = 0·4

If R_f value of a solution is zero, the solute remains in the stationary phase and thus it is immobile. If R_f value = 1 then the solute has no affinity for the stationary phase and travels with the solvent front.

R_f value depends on temperature and the solvent used in experiment.

Types of Paper Chromatography:

1. **Descending Paper Chromatography-**In this type, development of the chromatogram is done by allowing the solvent to travel down the paper.
2. **Ascending Paper Chromatography-**Here the solvent travel upward direction of the Chromatographic paper.
3. **Ascending-Descending Paper Chromatography-**It is the hybrid of both the above techniques. (The upper part of the Ascending chromatography can be folded over a rod and allowing the paper to become descending after crossing the rod.)
4. **Radial Paper Chromatography-**It is also called a Circular chromatography. Here a circular filter paper is taken and the sample is given at the center of the paper.
5. **Two-Dimensional Paper Chromatography-**In this technique a square or rectangular paper is used. Here the sample is applied to one of the corners and development is performed at right angle to the direction of first run

Blood transfusion

Blood transfusion is generally the process of receiving blood products into one's circulation intravenously. Transfusions are used for various medical conditions to replace lost components of the blood. Early transfusions used whole blood, but modern medical practice commonly uses only components of the blood, such as red blood cells, white blood cells, plasma, clotting factors, and platelets.

Cause/reason of transfusion

Red blood cell transfusion is considered when the hemoglobin level fell below 10 g/dL or hematocrit falls below 30% (hemorrhage, anaemia).
Patients with poor oxygen saturation may need more blood.
One may consider transfusion for people with symptoms of cardiovascular disease such as chest pain or shortness of breath.

Precautions during Blood Transfusion

To minimize the chance of an adverse reaction during a transfusion a drop of donor's blood is mixed with the recipient's blood to make sure they are compatible(cross-matching).

The blood must be transfused slowly, generally over 1 to 2 hours for each unit of blood. Because most adverse reactions occur during the first 15 minutes of the transfusion.

Hazards of blood transfusion

Fever

Fever may be caused by a reaction to the transfused white blood cells or to chemicals (cytokines) released by the transfused white blood cells.

Allergic reactions

Symptoms of an allergic reaction include itching, a widespread rash, swelling, dizziness, and headache.

Fluid overload

Too much fluid may cause swelling throughout the body or difficulty breathing. Recipients who have heart disease are most vulnerable.

Lung injury

Another very rare reaction, called transfusion-related acute lung injury (TRALI), is caused by antibodies in the donor's plasma.

Destruction of red blood cells

When a mismatch occurs, the recipient's body destroys the transfused red blood cells (a hemolytic reaction) shortly after the transfusion.

Graft vs host disease

Graft-versus-host disease is an unusual complication that affects primarily people whose immune system is impaired by drugs or disease. In this disease, donated white blood cells (the graft) attack the recipient's (host's) tissues. The symptoms include fever, rash, low blood pressure, low blood counts, tissue destruction, and shock.

Infections

Infectious organisms are sometimes transmitted during a transfusion.