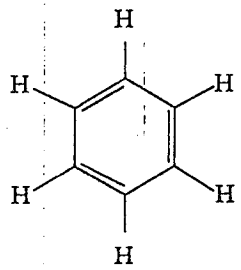
Stain

may be defined as an organic compound containing a benzene ring plus a chromophore and auxochrome group (Figure III.1).



Benzene

Organic colorless solvent

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Chromophore: Chemical group that imparts color to benzene

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Chromogen: Colored compound, not a stain

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Auxochrome: Chemical group that conveys the property of ionization to the chromogen, enabling it to form salts and bind to fibers or tissues

Stain

Bacterial staining

STAIN – an organic compound composed of a benzene ring, a Chromophore and auxochrome group.

Benzene is a organic colorless solvent.
Chromophore is the molecule that gives color to benzene.

(A CHROMOGEN – isn't a stain, just a colored molecule. It is made up of the benezene and the chromophore).

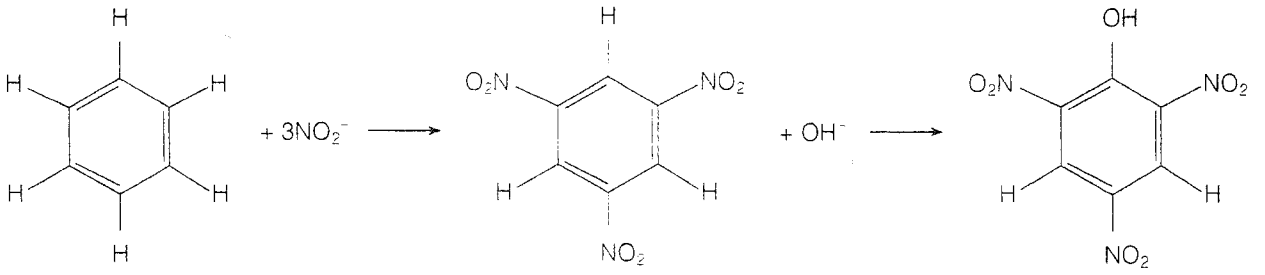
Auxochrome ionizes the chromogen, gives it a charge. This helps the chromogen form salts and bind to substances like tissues or fibers.

All tissue cells as well as stains exhibit some type of charge.

ACIDIC STAINS – are Anionic. Their chromogen exhibits a Negative charge. These type stains have an affinity for the Positive components of a cell.
Example – Picric Acid.

BASIC STAINS – are Cationic. Their chromogen exhibits a Positive charge. These type stains have a strong affinity for The negative components of a cell.
Example – Methylene Blue.

The stain picric acid may be used to illustrate this definition:



Benzene
colorless

Nitro groups
chromophore

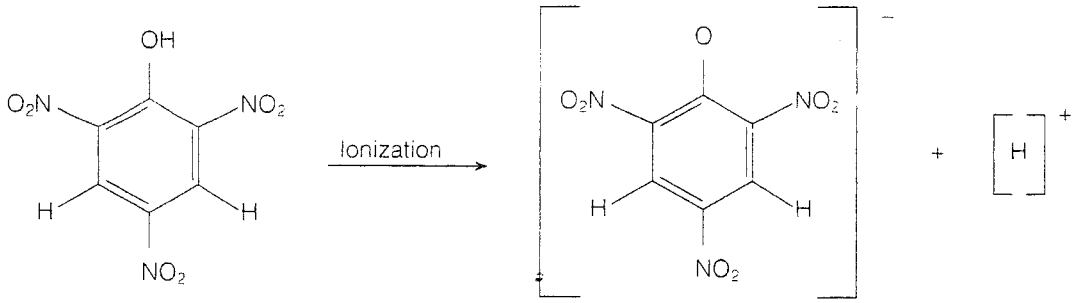
Trinitrobenzene
chromogen, yellow in color due to the presence of chromophores

Auxochrome

Trinitrohydroxybenzene
(picric acid) yellow stain

The ability of a stain to bind to macromolecular cellular components such as proteins or nucleic acids depends on the electrical charge found on the chromogen portion, as well as on the cellular component to be stained.

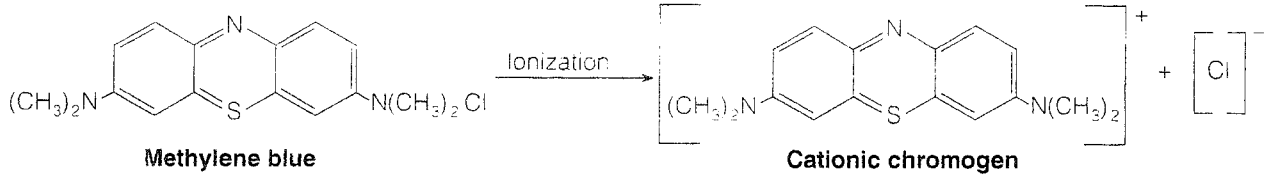
Acidic stains are anionic, which means that, on ionization of the stain, the chromogen portion exhibits a negative charge and therefore has a strong affinity for the positive constituents of the cell. Proteins, positively charged cellular components, will readily bind to and accept the color of the negatively charged, anionic chromogen of an acidic stain. Structurally, picric acid is an example of an acidic stain that produces an anionic chromogen as illustrated:



Picric acid

Anionic chromogen

Basic stains are cationic, because on ionization the chromogen portion exhibits a positive charge and therefore has a strong affinity for the negative constituents of the cell. Nucleic acids, negatively charged cellular components, will readily bind to and accept the color of the positively charged, cationic chromogen of a basic stain. Structurally, methylene blue is a basic stain that produces a cationic chromogen as illustrated:



Methylene blue

Cationic chromogen