Date:

Day: M T W T F S S



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I.D No : 14729

Paper: Radiology

## Question- 1

Differentiate between the calcium tungstate screens and rare earth screens?

## Answer

| Calcium tungstate Screen: | Rare earth Screen: |
|---|---|
| 1- Calcium tungstate screen conversion efficienty is 5%. | Rare earth screen conversion efficiency is 20%. |
| 2- Consversion efficiency is lowes than rare earth screen. | Conversion efficiency is highes than calcium tungstate screen. |
| 3- lowes image. | Blure image. |
| 4- white colour. | Blue colour. |

| | |
|---|---|
| 5- higher Patient dose. | lower patient dose. |
| 6- Speed 50-200 | speed 80-1200. |
| 7- calcium tungstate screen assigned to value of 100. | High speed rare earth screen have speed up to 1200. |
| 8- lower Absorbtion. | Higher Absorbtion. |
| 9- Thicker emission layer. | Thinner emission layer. |
| 10- High atomic No. | Low atomic No. |
| 11- Continous spectum. | Discret spectum. |
| 12- less image Nose. | High image Nose. |
| 13- violet to blue. | green blue. |
| 14- violeter Blue sensitive. | green sensitive film. |
| 15- 20-200 Hf | 40-400 Hf. |

Date:

Day: M T W T F S S



# Question-2

Explain the latent image formation?

## Answer

## Latent Image:

A latent image is an invisible image produced by the exposure to light of a photosensitive material such as photographic material.

## formation of the latent image:

The film emulsion is made of silver bromide crystals and silver iodide crystals that is precipitated in gelatin and layered on a thin sheet of transparent base.

Date:

Day: M T W T F S S



The silver halide crystals are chemically sensitized by the presence of sulphur compounds which cause physical irregularities in the crystal produced by iodide ions and these are called latent image sites.

The function of latent image site is to begin the process of image formation by trapping the electrons generated when the emulsion is irradiated.

when the silver halide crystals are irradiated the electron released changes bromide ion into bromine atoms. This will produce kinetic energy with which it moves in the crystal and strikes the image site imparting a negative charge to that region.

Date:

Day: M T W T F S S



Free positively charged interstitial silver ions are attached to the negative latent image site and neutralize the image site with the result that an atom of metalic silver is deposited at the site. After exposure of a film to radiation the aggregate of silver atoms at the latet image sites, comprises the latent image. It is the metalic silver at each latent image site that catalyses the development of the halide crystal in which it formed and renders the crystal sensitive to development and image formation.

Silver halide crystals absorb x-radiation during x-ray exposure and store the energy from the radiation.

The stored energy within

The silver halide crystals forms a pattern and creats an invisible image within the emulsion on exposed film.

This pattern of stored energy on the exposed film cannot be seen and is refered to as latent image.

The concentration of electrons at the sensitivity center produces a region of negativ electrifaction.

As halide atoms are removed from the crystal the positive silver ions are electrostatically attracted to the senstivity center.

After migrating to the senstivity center the Silver ions are neutralized by electrons and are converted to metalic silver.

Date:

Day: M T W T F S S

7

In an optimally exposed film most developable silver halide crystals have collected 4 to 10 silver atoms at a sensitivity center.

Consequently this silver deposition is not observable even microscopically.

This group of silver atoms is called latent image center. It is here that visible quantites of silver form during processing to create the radiographic image.

The unobservable information contained in radiation-activated and inactivated silver halide crystals constitutes the latent image.

Date:

Day: M T W T F S S

## Question- 3 8

Briefly describe the construction of radiographic film with diagram?

## Answer

## Radiographic film

Radiographic film consist of an emulsion-gelatin containing radiation sensitive silve halide crystals such as silver bromide or silver chloride and a flexible transparent, blue tinted base.

## Construction of radiographic film :

## Base film :

1- The base is the foundation of radiographic film.

Date:

Day: M T W T F S S



1- The primary purpose is to provide a rigid structure onto which the emulsion can be coated.

2- The base is flexible and fracture resistant to allow easy handling but is rigid enough to be snapped into a viewbox.

3- The base of radiographic film is 150 to 300 um thick, semirigid, lucent and made of polyester.

4- The base is of uniform lucency and is nearly transparent to light.

5- The original radiographic film base was a glass plate.

6- In the early 1960s a polyester base was introduced.

7- polyester has taken the

place of cellulose triacetate as the film base of choice.

## Emulsion:

1- The Emulsion is the heart of the radiographic film.

2- It is the material with which x-rays or light photons from radiographic intensifying screens interact.

3- The emulsion consists of a homogenous mixture of gelatin and silver.

4. It is coated evenly with a layer that is 3 to 5 thick.

5- Tabular grains are used in most radiographic film.

6- Its principle function is to provide mechanical support for silver halide crystals by holding them uniformly

dispessed in place.

7. The crystals are made by dissolving metalic silver in nitric acid to form silver nitrate.

8. Radiographic film is manufactured in total darkness, from the moment the emulsion ingredients are brought together final packaging no light is present.

- Most film has two layers of emulsion so it is refered to as Double emulsion film.
- An adhesive layer attaches the emulsion to the base.
- The emulsion is enclosed in a protective layer or overcost.

Date:

Day: M T W T F S S

# Diagram :