Experiment number( 2)

**Inverse square law and radiographic density**

**Objective**:To apply the principles of the inverse square law to a practical situation.

To demonstrate that the radiographic density of an image can be maintained at different FFD by adjusting the mAs according to the principles of the inverse square law.

**Procedure**:

The inverse square law states that the intensity of an X-ray beam is inversely proportional to the square of the distance from its source to the film.

A practical formula based on the principles of the inverse square law has been developed, enabling us to accurately adjust our exposure factors to maintain the density at different FFD.

2

NEW mAs = OLD mAs X (NEW DISTANCE)

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2

(OLD DISTANCE)

Part one:

Using 35x35 cm cassette ,elbow phantom and a lead apron.

The cassette will be divided into 3 sections (using the lead apron) to record 3 images.

the elbow phantom is centered to one section at a time, and the x-ray beam is collimated to the elbow phantom.

Three exposures are made as following:

|  |  |  |  |
| --- | --- | --- | --- |
| **section** | **KV** | **mAs** | **FFD** |
| 1st | 45 | 2.5 | 100 |
| 2nd | 45 | 2.5 | 120 |
| 3rd | 45 | 2.5 | 80 |

**ــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــ**

Part Two:

Using 35x35 cm cassette ,elbow phantom and a lead apron.

The cassette will be divided into 3 sections (using the lead apron) to record 3 images.

the elbow phantom is centered to one section at a time, and the x-ray beam is collimated to the elbow phantom.

Three exposures are made as following:

|  |  |  |  |
| --- | --- | --- | --- |
| **section** | **KV** | **mAs** | **FFD** |
| 1st | 45 | 2.5 | 100 |
| 2nd | 45 | 3.6 (we will use 4) | 120 |
| 3rd | 45 | 1.6 (we will use 2) | 80 |

The mAs is changed with the change of the FFD according to the inverse square law.

**Conclusion:**

Density is ***inversely proportional*** to the FFD.

As the distance is increased the Density will decrease.

*In part one :*

Since the mAs was not changed with the change of the FFD:

The density in 1st section is ***optimum*** because the FFD is ***optimum*** ( 100).

The density in 2nd section is ***low*** because the FFD is ***long*** ( 120).

The density in 3rd section is ***high*** because the FFD is ***short*** ( 80).

*In part two* :

Since the mAs was changed with the change of the FFD (according to the inverse square law):

although the distance was changed, the density in 1st ,2nd and 3rd section are almost the same(density was maintained ) because we applied the inverse square law.