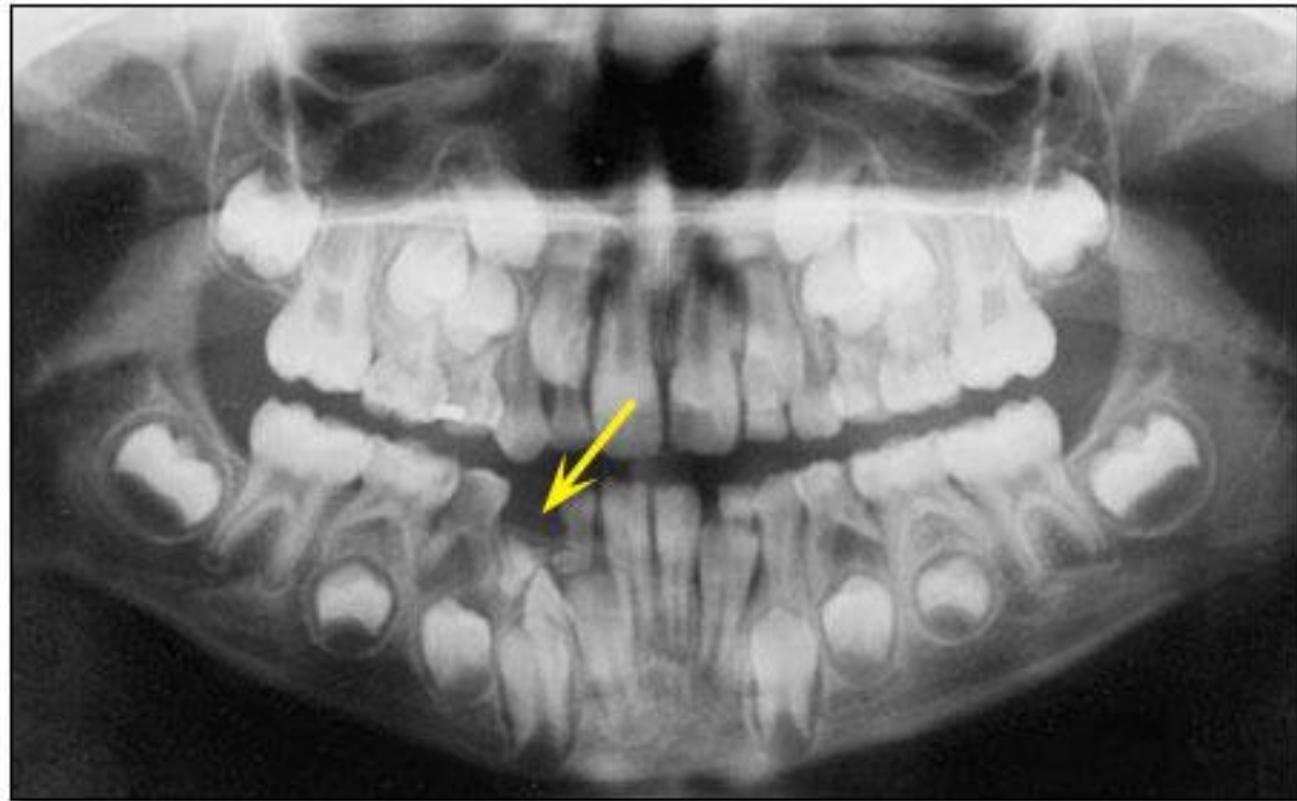


Dental Radiology Related With Pedodontics



Presented by:

Dr. Rajeev Kumar Singh

Radiology

The branch of medicine that deals with the use of X-rays and radioactive substances in the diagnosis and treatment of diseases.



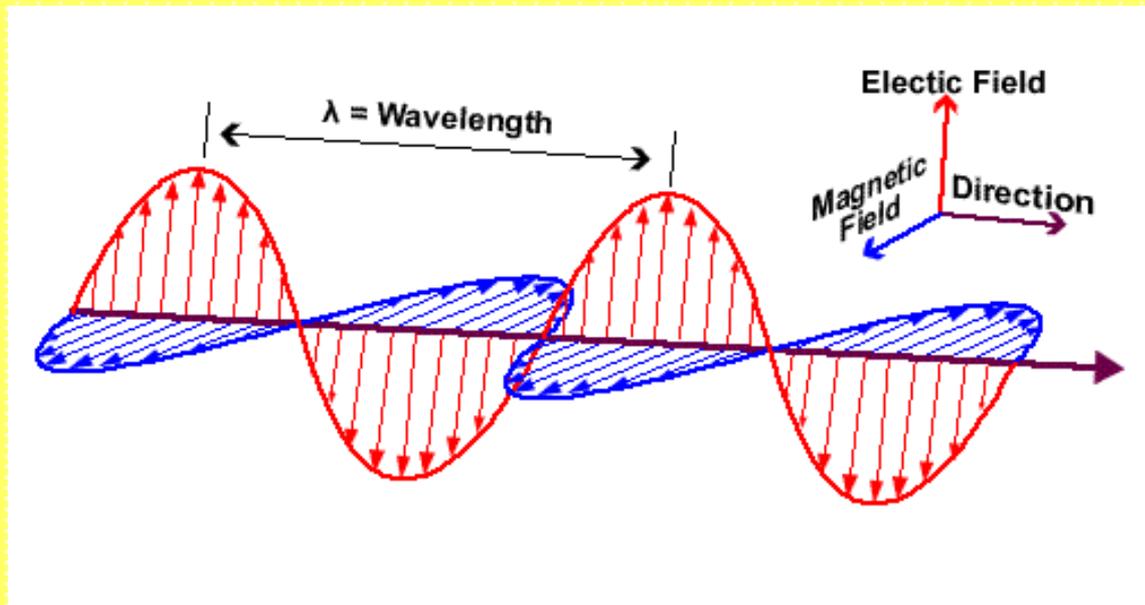
Radiograph

An image produced on a radiosensitive surface, such as a photographic film, by radiation other than visible light, as by x-rays passed through an object.



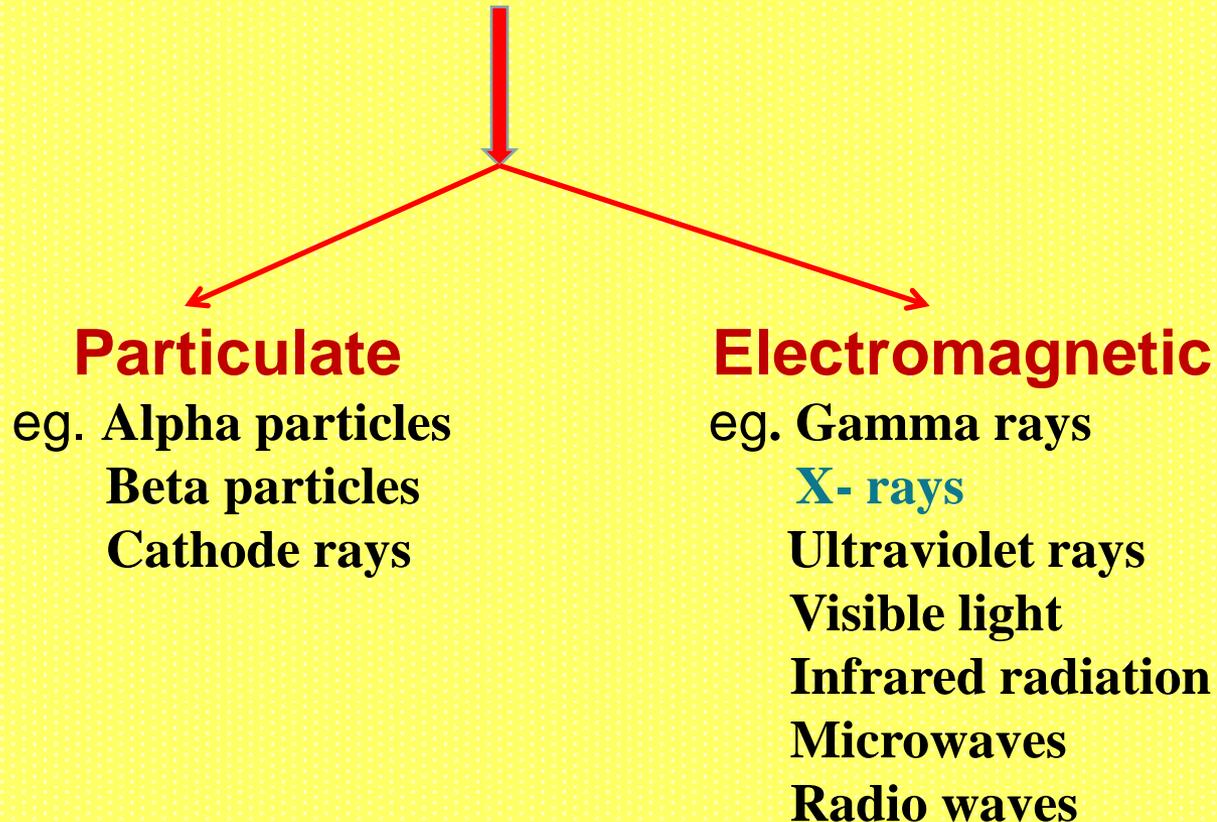
Radiation

The emission of energy as electromagnetic waves or as moving subatomic particles, especially high-energy particles which cause ionization.

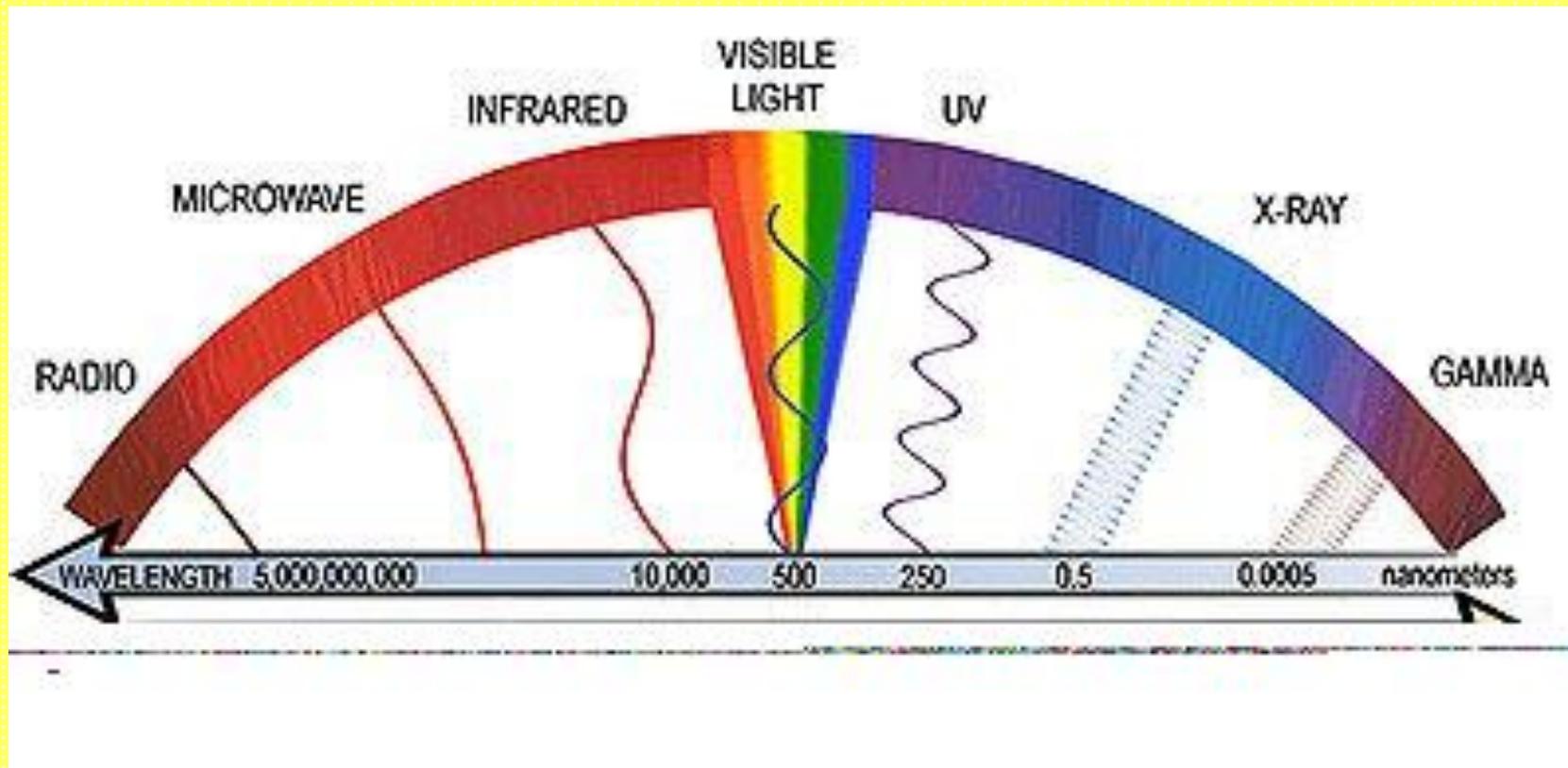


Types of radiation

Transmission of energy through space and matter

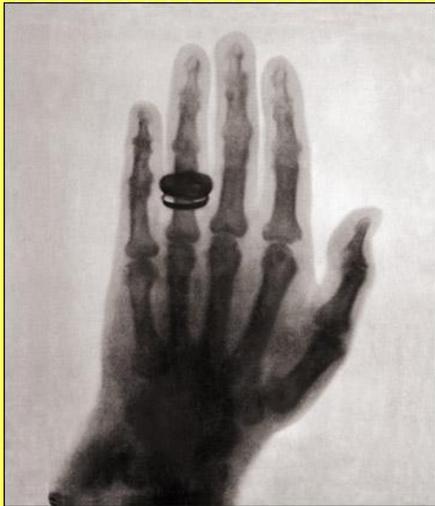
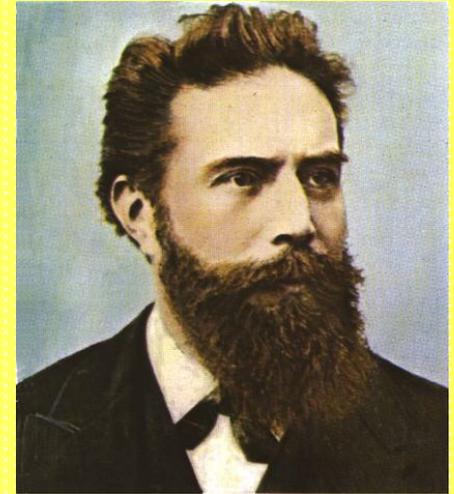


ELECTROMAGNETIC SPECTRUM



X-rays

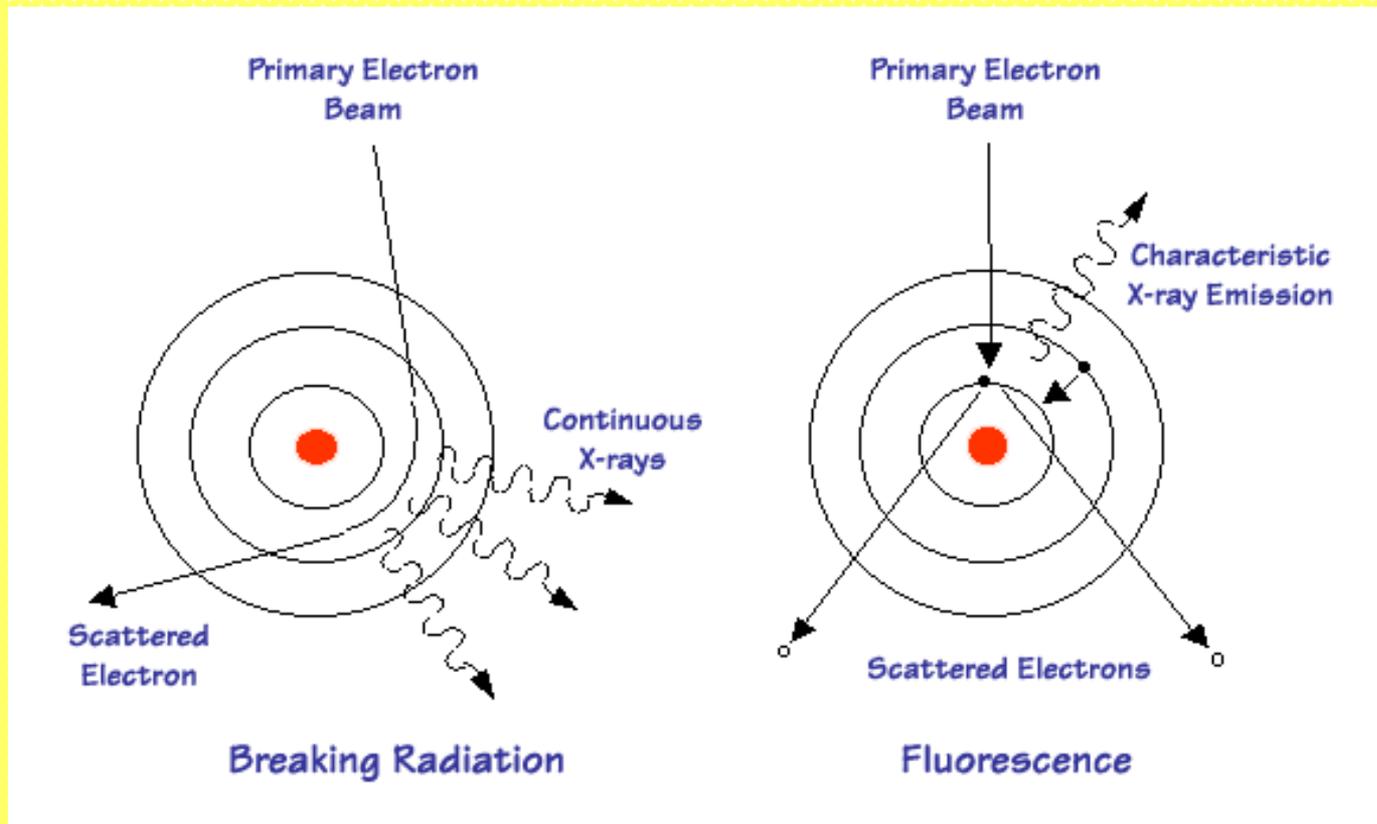
German physics professor Wilhelm Conrad Rontgen was first to report about X-rays in 1895 & also discovered its medical use.



He noticed that barium Platinocyanide emits a fluorescent glow. He Combined his observation with a photographic plate. With his wife's hand, he made the first X-ray photo.

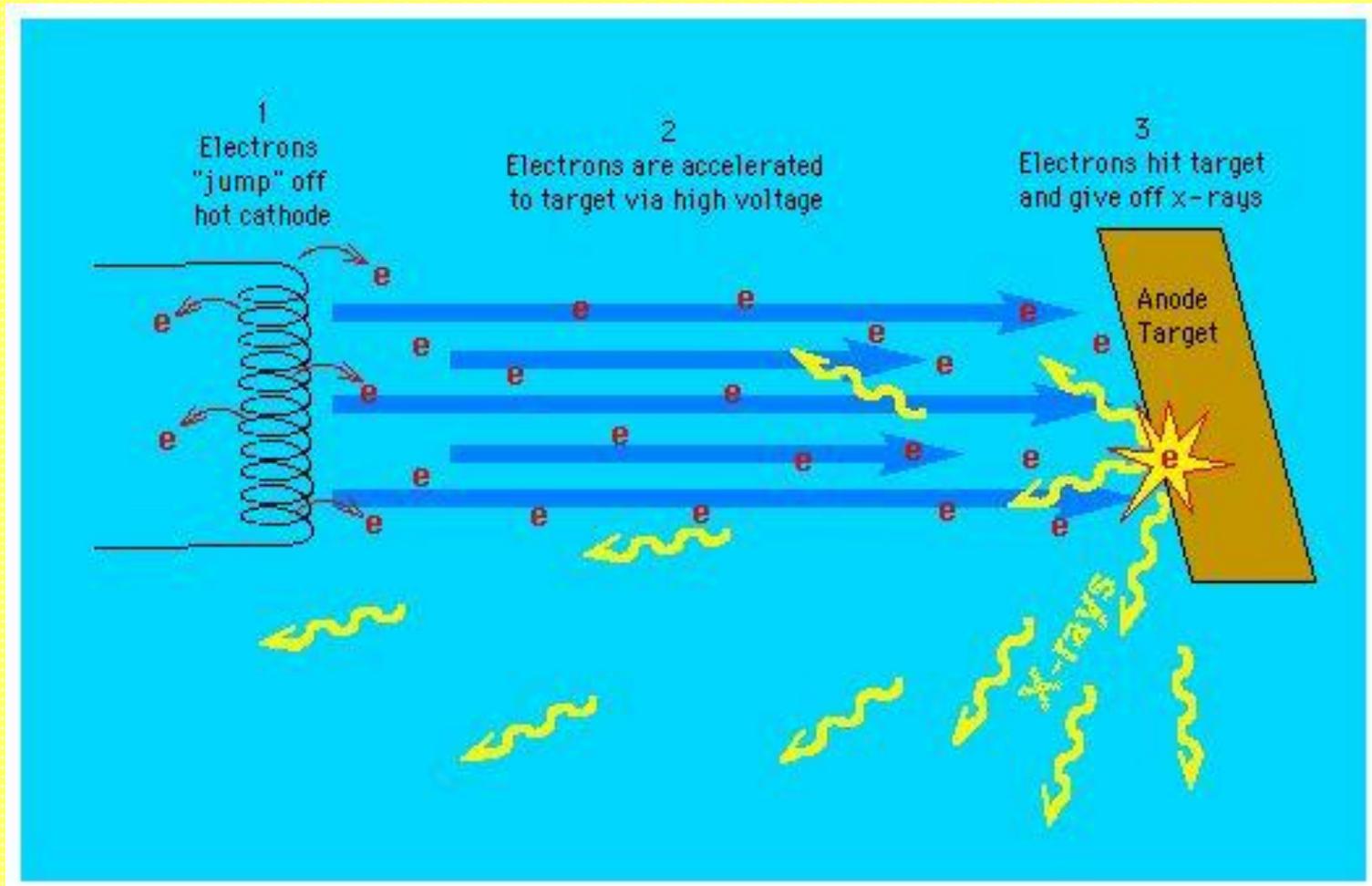
X-rays cont...

- X-rays are high energy photons.
- Named X-rays-due to unknown nature and properties.

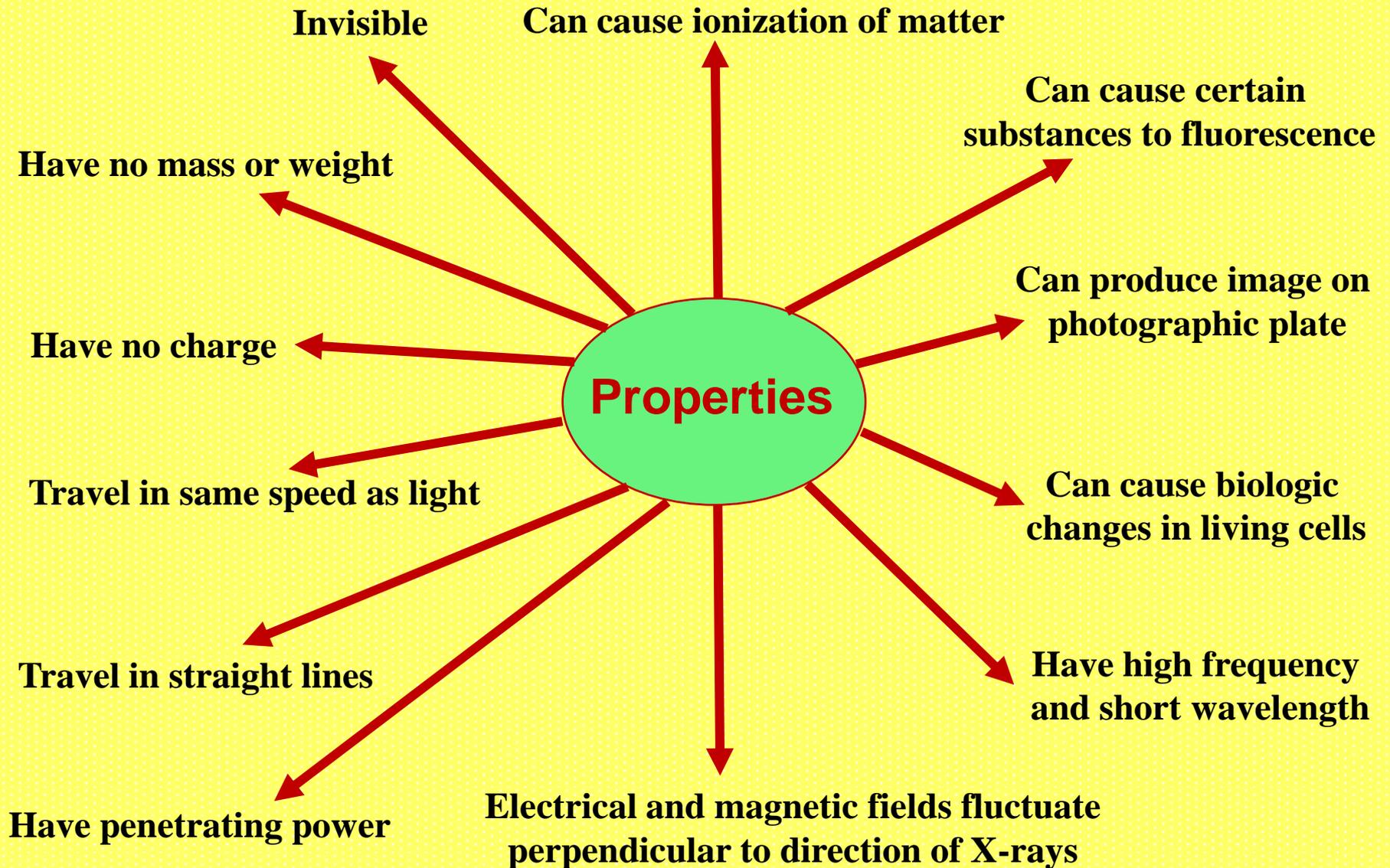


Production of X-rays

- Produced extra-nuclearly from the interaction of electrons with nuclei in X-ray machines.

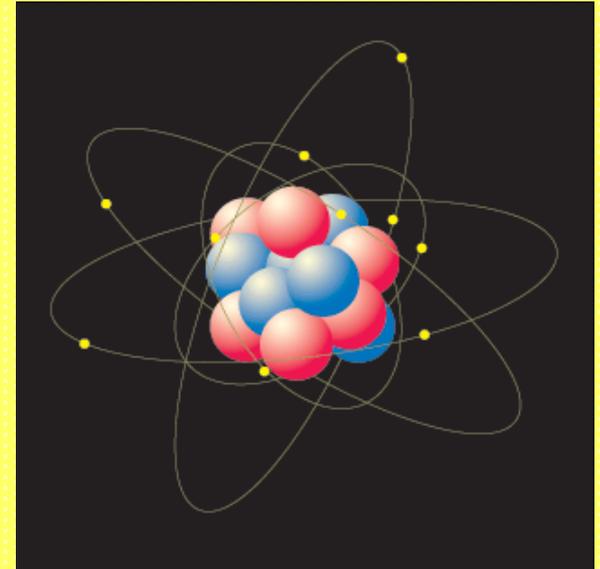


Properties of x-rays



Ionization

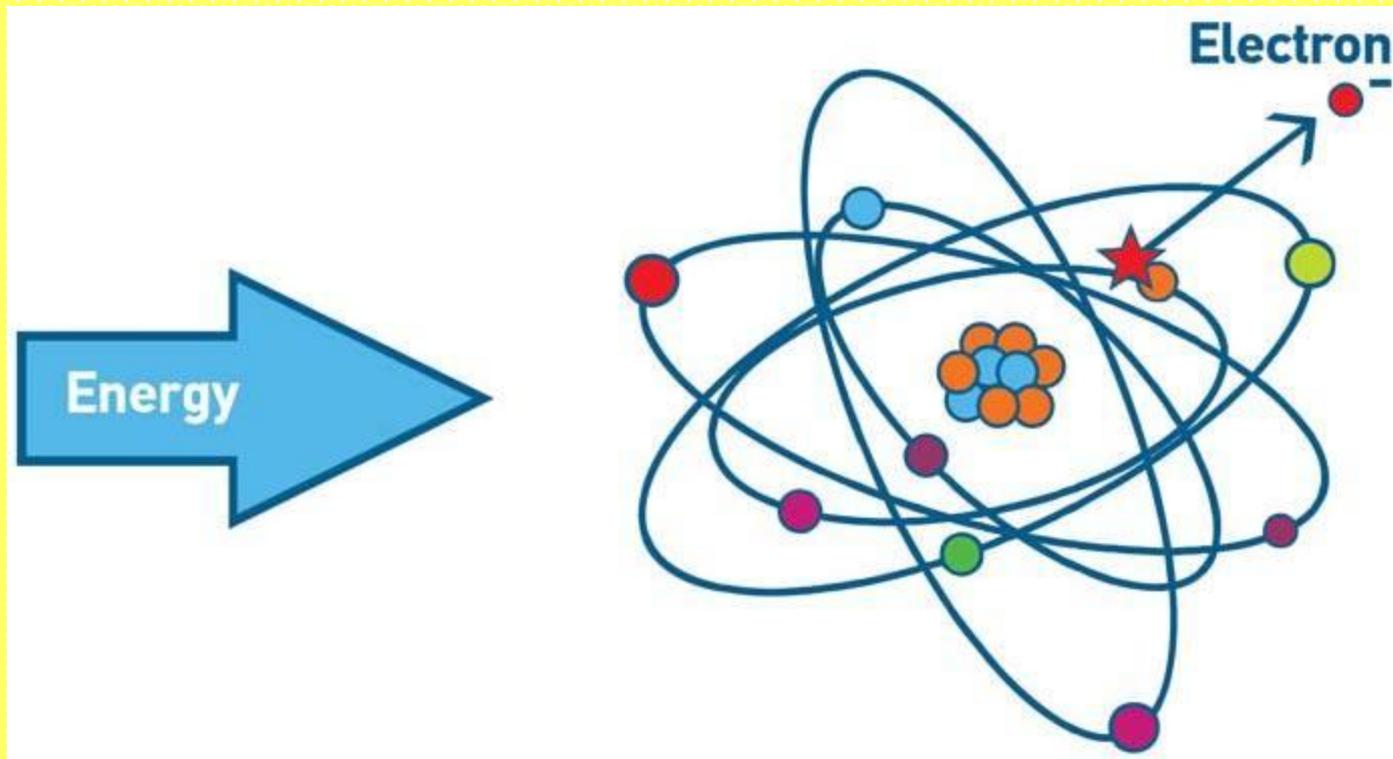
➤ The smallest portion into which an element can be divided and still retain its properties, made up of a dense, positively charged nucleus surrounded by a system of electrons.



➤ Atoms usually do not divide in chemical reactions except for some removal, transfer, or exchange of specific electrons.

Ionization cont...

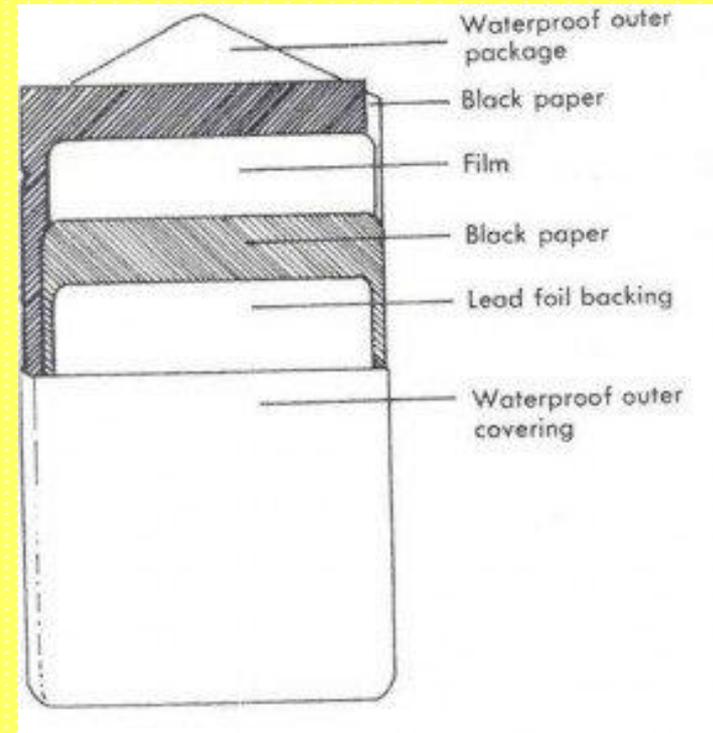
A process in which an atom or molecule loses or gains electrons, acquiring an electric charge or changing an existing charge.



X-ray films

Image receptor used to record the images

- **The film is encased in a protective black paper wrapper & backed by a thin sheet of lead foil.**
- **Black paper covers the film & shields the film from light.**
- **Lead foil protect the film from secondary or scattered radiation & gives rigidity of the packet. The films are wrapped in packets of white, pebbled, moisture-resistant paper or polyvinyl wrap.**
- **There is a raised dot [Embossed dot] is seen on one corner of the film packet, which helps to orient the film towards the x-ray beam.**



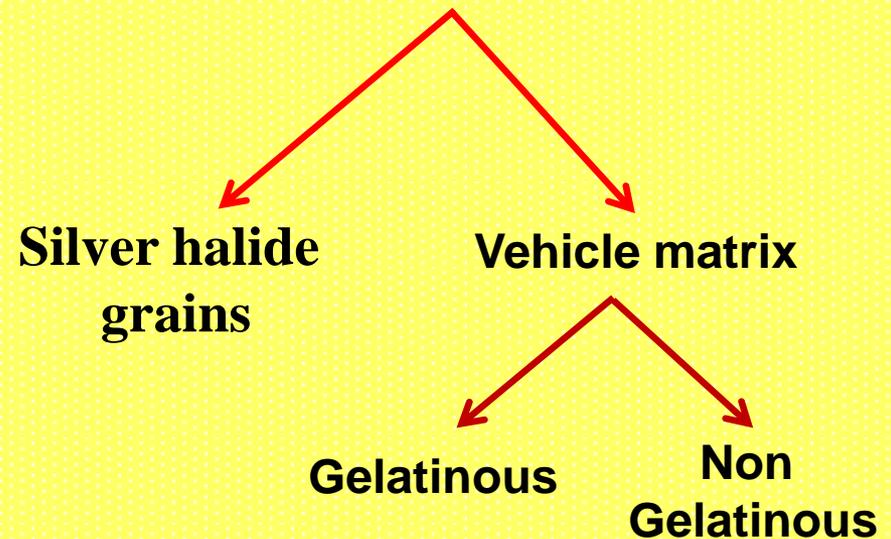
Composition of X-ray films

BASE

- Plastic supporting material onto which emulsion is coated
- Supports the emulsion
- Made of Polyester Polyethylene-Terephthalate
- 0.18 mm thick

EMULSION

Sensitive to x rays & visible light, records radiographic image



Dental Radiographs

```
graph TD; A[Dental Radiographs] --> B[Intra oral]; A --> C[Extra oral]; B --> B1[IOPA]; B --> B2[Bite Wing]; B --> B3[Occlusal]; C --> C1[O.P.G.]; C --> C2[Lateral Cephalogram]; C --> C3[PA Cephalogram]; C --> C4[Submentovertex]; C --> C5[Waters view]; C --> C6[Reverse Towne]; C --> C7[Lateral Oblique];
```

Intra oral

IOPA

Bite Wing

Occlusal

Extra oral

O.P.G.

Lateral Cephalogram

PA Cephalogram

Submentovertex

Waters view

Reverse Towne

Lateral Oblique

Intra-oral Periapical Radiographs (IOPA)

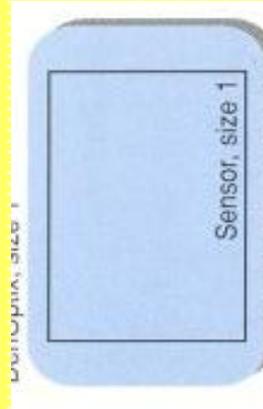
Used to record the crowns, roots and surrounding bone.



Size of IOPA films



Size **0**



Size **1**



Size **2**

Size **0**: for small children (**22x35** mm)

Size **1**: anterior teeth (**24x40** mm)

Size **2**: adults (**31x41** mm)

Size **3**: bitewings of adults (**27x54** mm)

Bitewing Radiographs

- Useful to detect the incipient proximal caries
- The coronal portion of both the maxillary and mandibular teeth of the required area can be visualized on the film.
- IOPA films are used.



Occlusal Radiographs

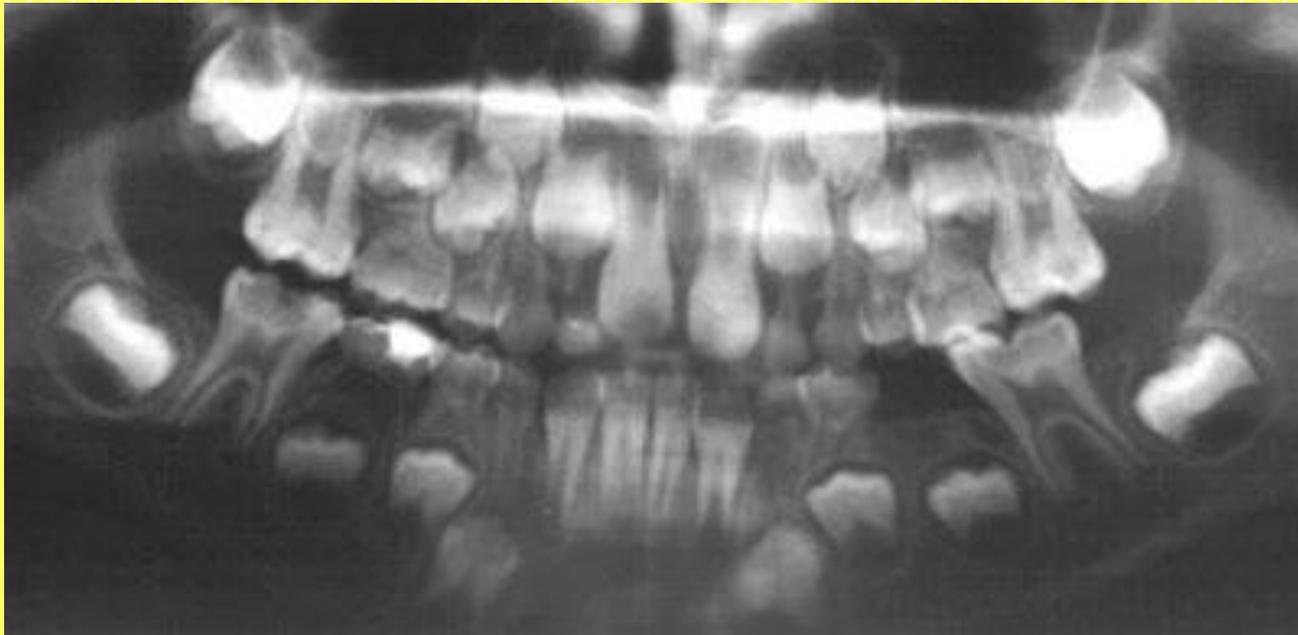
- Used in the evaluation of entire maxillary arch or mandibular arch.
- Size: 57x76 mm



Extra oral radiographs

OPG (Ortho Pantomograph)

- Records a single image of facial structures including both maxillary and mandibular arches and their supporting structure
- Size: 6 x 12 inch and 5 x 12 inch sizes



Indications of OPG:

- **Evaluation of trauma**
- **Location of third molars**
- **Extensive disease**
- **Known or suspected large lesions**
- **Tooth development**
- **retained teeth or root tips**
- **Developmental anomalies**

Disadvantages of OPG:

- **Do not display fine anatomic details available on IOPA
x-ray**

Clinical situations for which radiographs may be indicated

Positive Historical Findings:

- Previous periodontal or endodontic treatment
- History of pain or trauma
- Familial history of dental anomalies
- Postoperative evaluation of healing
- Remineralization monitoring
- Presence of implants or evaluation for implant placement



Positive Clinical Signs/Symptoms

- Clinical evidence of periodontal disease
- Large or deep restorations
- Deep carious lesions
- Swelling
- Evidence of dental/facial trauma
- Mobility of teeth
- Sinus tract (“fistula”)
- Clinically suspected sinus pathology
- Growth abnormalities
- Oral involvement in known or suspected systemic disease



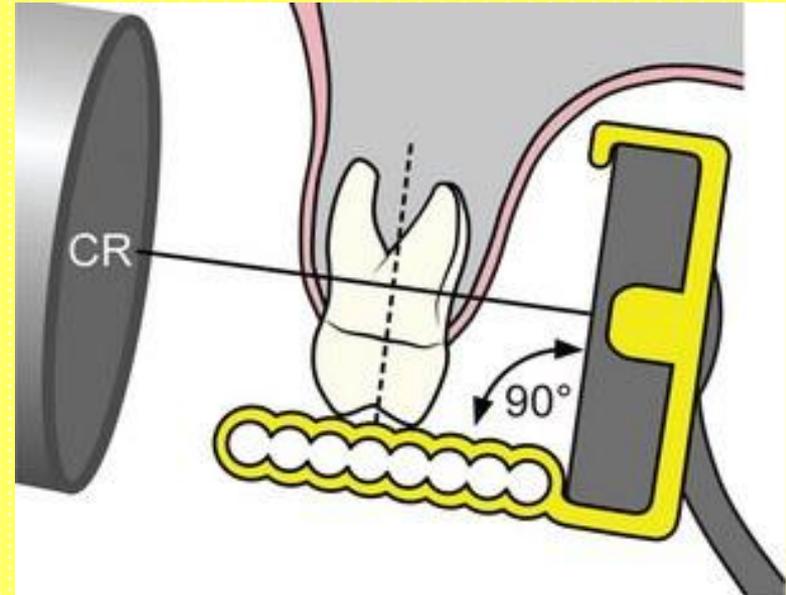
Intraoral periapical radiograph techniques

Paralleling Technique

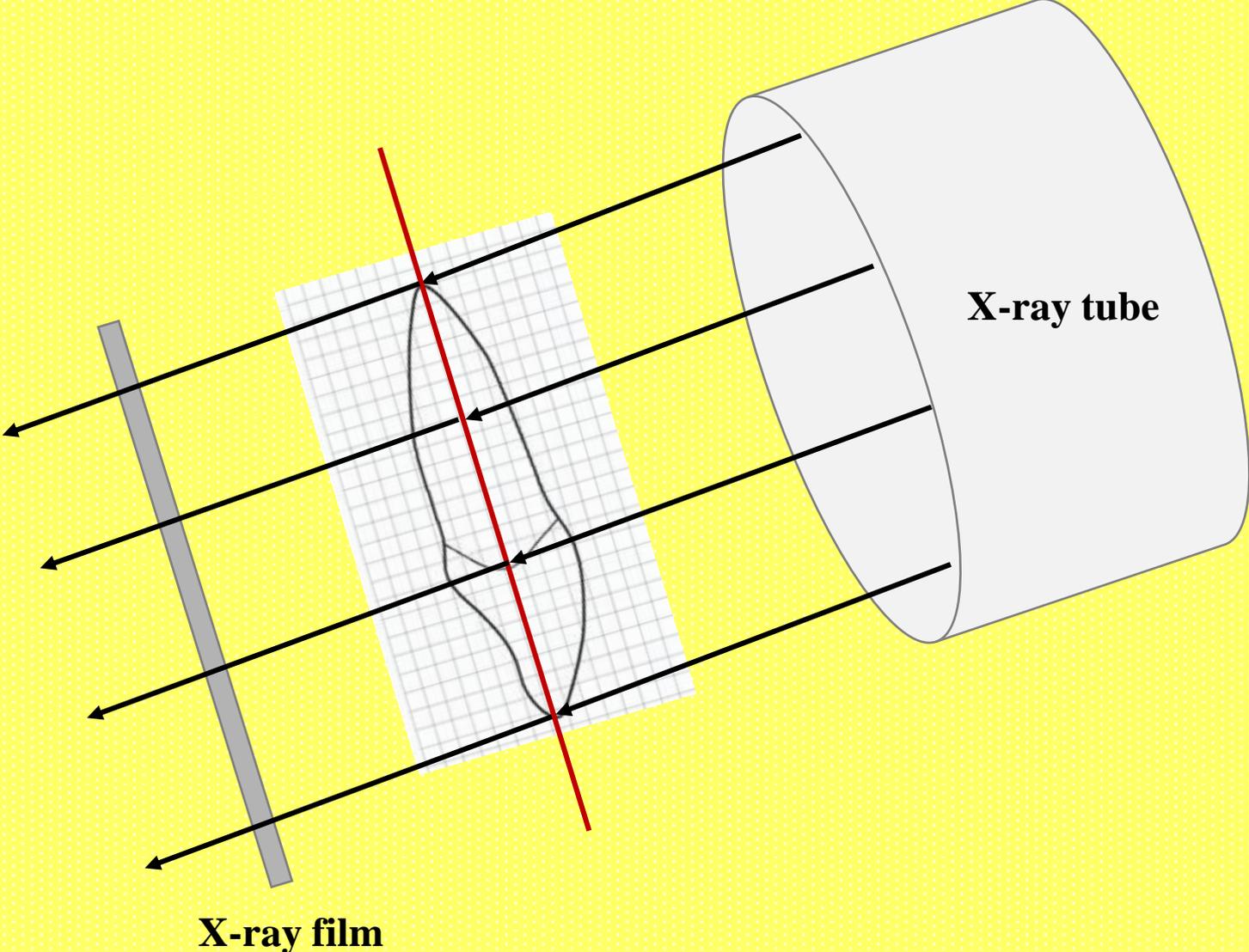
Bisecting angle Technique

Paralleling Technique

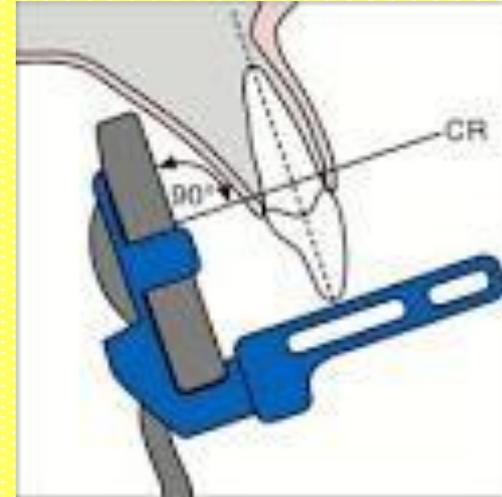
- The x-ray film is supported parallel to the long axis of the teeth and the central ray of the x-ray beam is directed at right angles to the teeth and film.
- This orientation of the film, teeth and central ray minimizes geometric distortion.
- To reduce geometric distortion further, the x-ray source should be located relatively distant from the teeth.



Paralleling Technique

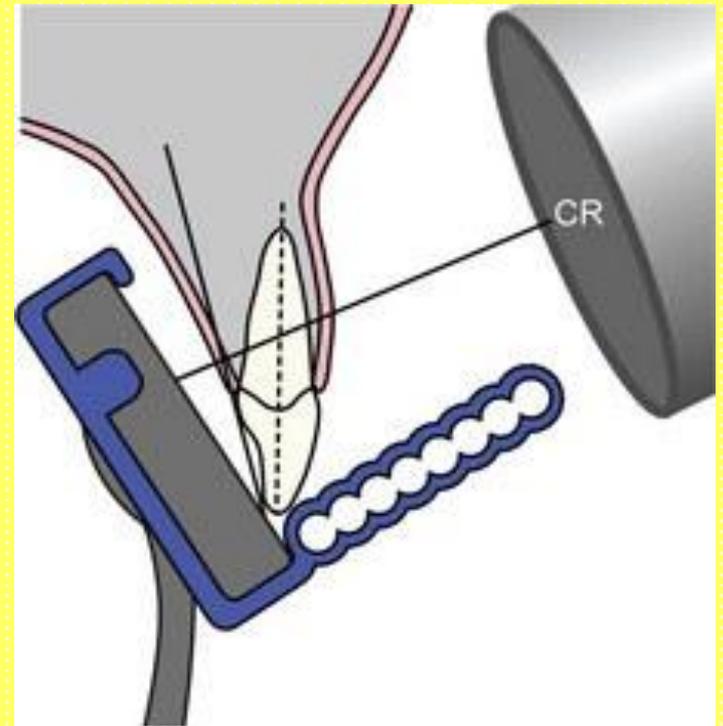


Paralleling Technique- x ray film holders



Bisecting-Angle Technique

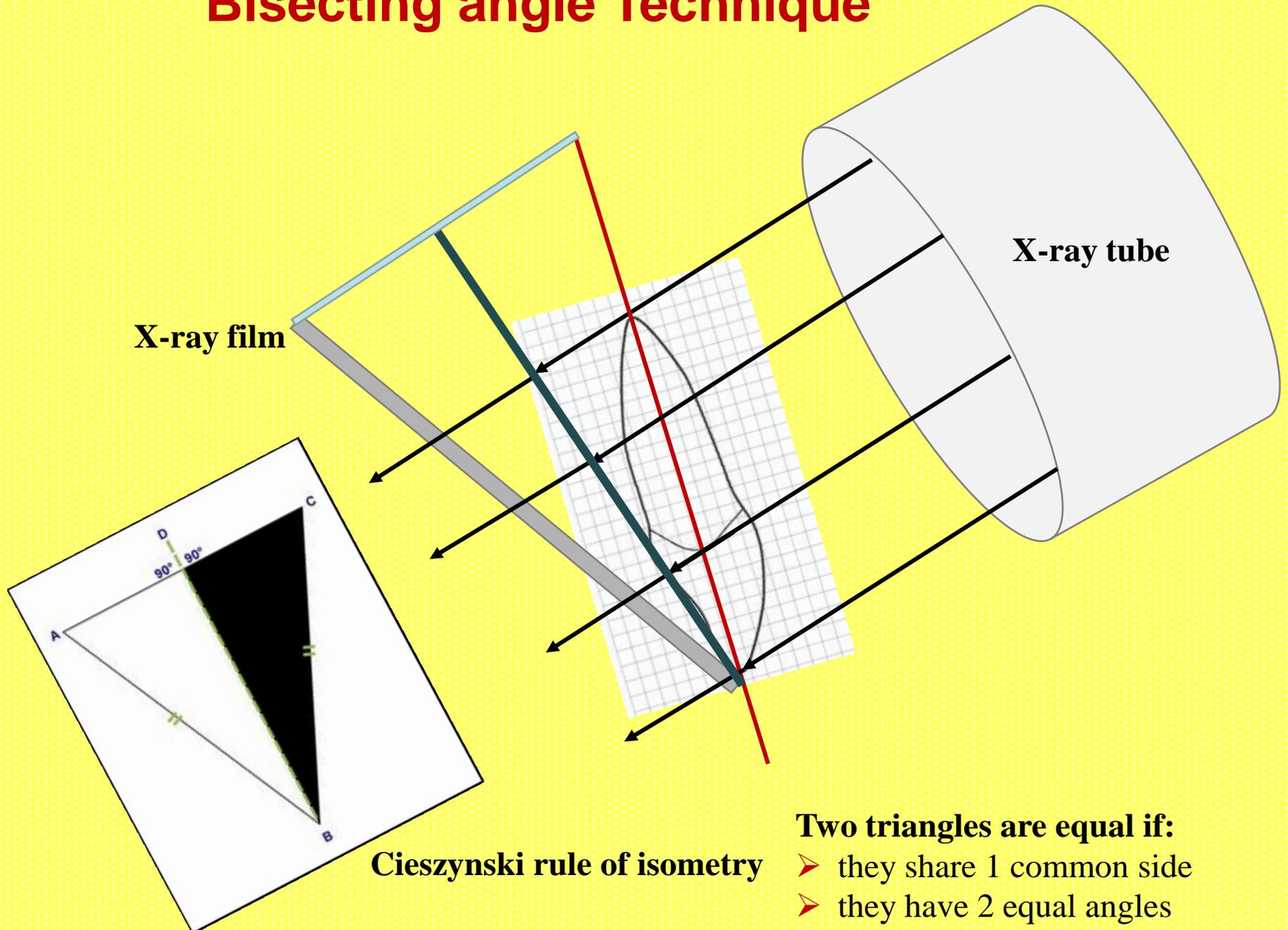
Position of the film as close as possible to the lingual surface of teeth, resting on the palate or in the floor of the mouth.



Bisecting angle Technique

- **The plane of the film and the long axis of the teeth form an angle with its apex at the point where the film is in the contact with the teeth.**
- **An imaginary line bisects this angle and direct the central ray of the beam at right angles to this bisector.**
- **When this conditions are satisfied, the images cast on the film theoretically are the same length as the projected**

Bisecting angle Technique



Cieszynski rule of isometry

- Two triangles are equal if:**
- they share 1 common side
 - they have 2 equal angles

Angulation guidelines for bisecting angle projections

<u>Projection</u>	<u>Maxilla</u>	<u>Mandible</u>
Incisors	+40 degrees	-15 degrees
Canines	+45 degrees	-20 degrees
Premolars	+30 degrees	-10 degrees
Molars	+20 degrees	-5 degrees

Processing x ray films

- **Immerse x ray film in developer**
- **Rinse film in a water bath**
- **Immerse film in fixer**
- **Wash film in water bath**
- **Dry film and mount film for viewing**

Developer solution

The developer reduces all silver ions in the exposed crystals of silver halide to metallic silver grains

Contains four components dissolved in water:

- 1) Developer
- 2) Activator
- 3) Preservative
- 4) Restrainer



Rinsing

- After development the film emulsion swells and become saturated with water.
- Films are now rinsed in water for **30** seconds to dilute the developer thus slowing the development process.
- Rinsing also removes the alkali activator, preventing neutralization of acid fixer.

Fixing solution

- The primary function is to dissolve and remove the underdeveloped silver halide crystals from the emulsion.
- The presence of unexposed crystals cause films to be opaque, dark and non-diagnostic.
- Fixer also contains four components dissolved in water:
 1. Clearing agent
 2. Acidifier
 3. Preservative
 4. Hardener

Importance of radiographs

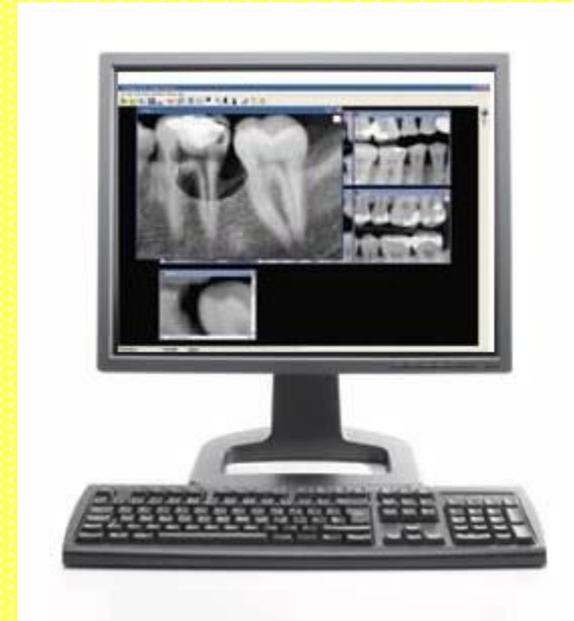
- Plays a vital role in the diagnosis and treatment planning of both children and adults.
- Plays a significant role in the assessment of growth and development.
- At the simplest level, help in the detection of dental caries and at the most complex level, in the diagnosis of cysts, tumors or any other major craniofacial disorders.

Digital X-rays

Sensors are used instead of films

Benefits of digital x-rays over film:

- reduced radiation exposure
- shorter time to take images
- instant analysis
- no chemicals needed for processing
- easy to duplicate



M

C

Qs

MCQ 1

X-rays were discovered in:

- a) 1875**
- b) 1885**
- c) 1895**
- d) 1995**

MCQ 2

Which of the following is true regarding x-rays:

- a) X-rays are high energy photons**
- b) Travel faster than light**
- c) Have low frequency and high wavelength**
- d) All of the above**

MCQ 3

Which of the following is an extra oral radiograph:

- a) IOPA
- b) Bitewing
- c) Occlusal
- d) OPG

MCQ 4

Which of the following film size is used for IOPA x-ray of small children:

- a) Size 1**
- b) Size 2**
- c) Size 0**
- d) Size 3**

MCQ 5

What are the dimensions of size 2 IOPA x-ray films:

- a) **22x35 mm**
- b) **35x40 mm**
- c) **31x41 mm**
- d) **27x54 mm**

MCQ 6

What are the indications of OPG x-ray:

- a) Known or suspected large lesions**
- b) Tooth development**
- c) Developmental anomalies**
- d) All of the above**

MCQ 7

In bisecting angle technique, the x-rays are directed:

- a) Perpendicular to the long axis of tooth**
- b) Perpendicular to the x-ray film**
- c) Perpendicular to an imaginary line between long axis of tooth and x-ray film**
- d) Parallel to the long axis of the tooth**

MCQ 8

What is the angle of x-ray tube for the maxillary premolar in bisecting angle technique:

- a) +45 degree**
- b) +30 degree**
- c) +40 degree**
- d) +20 degree**

MCQ 9

Which of the following is true regarding digital x-rays:

- a) There is less exposure time**
- b) It takes more time to process the images**
- c) The can not be duplicated**
- d) They are not environment friendly**

MCQ 10

Developer solution contains all of the following except:

- a) **Activator**
- b) **Preservative**
- c) **Restrainer**
- d) **Acidifier**

Thank You

