Chapter -2 *X-Ray Assignment*

The radiation-electron interaction that gives rise to an absorption process occurs mainly with atomic electrons, i.e with bound electrons in general. In this section, we address the elementary interaction of X-rays with free electrons.

Short answer type question

1. What is X-ray? What are the differences between visible light and X-ray?
2. Write the important properties of X-ray.
3. Describe Coolidge Tube and explain how x-ray is produced.
4. What do you mean by Soft and Hard X-ray?
5. Write the uses of x-ray.

MCQ on X-rays

- 1) An X-ray tube is operated at 50 kV. The minimum wavelength produced is [CPMT 1996]

A) 0.5 A

B) 0.75 A

C) 0.25 A

D) 1 A

View Solution play_arrow

- question_answer2) Which of the following wavelength falls in X-ray region [CPMT 1975; MP PMT 1984]

A) 10000 A

B) 1000 A

C) 1 A

D) 10?2 A

View Solution play_arrow

- question_answer3) A metal block is exposed to beams of X-ray of different wavelength. X-rays of which wavelength penetrate most [NCERT 1980; JIPMER 2002]

A) 2 A

B) 4 A

C) 6 A

D) 8 A

View Solution play_arrow

- question_answer4) X-rays and gamma rays are both electromagnetic waves. Which of the following statements is true [NCERT 1973]

A) In general X-rays have larger wavelength than of gamma rays

B) X-rays have smaller wavelength than that of gamma rays

C) Gamma rays have smaller frequency than that of X-rays

D) Wavelength and frequency of X-rays are both larger than that of gamma rays

View Solution play_arrow

- question_answer5) In producing X-rays a beam of electrons accelerated by a potential difference V is made to strike a metal target. For what value of V, X-rays will have the lowest wavelength of 0.3094 A [CPMT 1982; NCERT 1986, 87]

A) 10 kV

B) 20 kV

C) 30 kV

D) 40 Kv

View Solution play_arrow

- question_answer6) In radio theraphy, X-rays are used to [CPMT 1972; BHU 2005]

A) Detect bone fractures

B) Treat cancer by controlled exposure

C) Detect heart diseases

D) Detect fault in radio receiving circuits

View Solution play_arrow

- question_answer7) Hydrogen atom does not emit X-rays because [NCERT 1979; CPMT 1980, 90; RPET 1999]

A) Its energy levels are too close to each other

B) Its energy levels are too apart

C) It is too small in size

D) It has a single electron

View Solution play_arrow

- question_answer8) X-rays were discovered by [NCERT 1977; BHU 2005]

A) Becquerel

B) Roentgen

C) Marie Curie

D) Von Laue

View Solution play_arrow

- question_answer9) X-rays are [CPMT 1975; EAMCET 1995; RPET 2000; SCRA 1994]

A) Stream of electrons

B) Stream of positively charged particles

C) Electromagnetic radiations of high frequency

D) Stream of uncharged particles

View Solution play_arrow

- question_answer10) The voltage applied across an X-rays tube is nearly [CPMT 1983]

A) 10 V

B) 100 V

C) 10000 V

D) 106 V

View Solution play_arrow

- question_answer11) The characteristic X-ray radiation is emitted, when [CPMT 1975, 80, 90; RPET 1999]

A) The electrons are accelerated to a fixed energy

B) The source of electrons emits a monoenergetic beam

C) The bombarding electrons knock out electrons from the inner shell of the target atoms and one of the outer electrons falls into this vacancy

D) The valence electrons in the target atoms are removed as a result of the collision

View Solution play_arrow

- question_answer12) Molybdenum is used as a target element for production of X-rays because it is [CPMT 1980; RPET 1999]

A) A heavy element and can easily absorb high velocity electrons

B) A heavy element with a high melting point

C) An element having high thermal conductivity

D) Heavy and can easily deflect electrons

View Solution play_arrow

- question_answer13) Mosley's law relates the frequencies of line X-rays with the following characteristics of the target element [CPMT 1980; NCERT 1985]

A) Its density

B) Its atomic weight

C) Its atomic number

D) Interplaner spacing of the atomic planes

View Solution play_arrow

- question_answer14) Compton effect is associated with [CPMT 1971]

A) $\alpha-$ **rays**

B) $\beta-$ **rays**

C) X-rays

D) Positive rays

View Solution play_arrow

- question_answer15) X-rays are in nature similar to

A) Beta rays

B) Gamma rays

C) de-Broglie waves

D) Cathode rays

View Solution play_arrow

- question_answer16) If the cathode?anode potential difference in an X-ray tube be 105 V, then the maximum energy of X-ray photon can be

A) 105 J

B) 105 MeV

C) 10?1 MeV

D) 105 KeV

View Solution play_arrow

- question_answer17) The shortest wavelength of X-rays emitted from an X-ray tube depends on the [MP PMT 1987; CPMT 1988, 92; IIT 1982]

A) Current in the tube

B) Voltage applied to the tube

C) Nature of gas in the tube

D) Atomic number of target material

View Solution play_arrow

- question_answer18) The wavelength of X-rays is of the order of [CPMT 1983; MP PMT 1987; KCET 1994; JIPMER 1997]

A) Centimetre

B) Micron (10-6 m)

C) Angstrom (10-10 m)

D) Metre

View Solution play_arrow

- question_answer19) X ? rays and

γ–

rays of the same energies may be distinguished by [CPMT 1985]

A) Their velocity

B) Their ionising power

C) Their intensity

D) Method of production

View Solution play_arrow

- question_answer20) When a beam of accelerated electrons hits a target, a continuous X-ray spectrum is emitted from the target. Which of the following wavelength is absent in the X-ray spectrum, if the X-ray tube is operating at 40,000 volts [MP PMT 1993; NCERT 1984; MNR 1995; RPMT 2002]

A) 0.25 A

B) 0.5 A

C) 1.5 A

D) 1.0 A

View Solution play_arrow

- question_answer21) For continuous X-rays produced wavelength is

A) Inversely proportional to the energy of the electrons hitting the target

B) Inversely proportional to the intensity of the electron beam

C) Proportional to intensity of the electron beam

D) Proportional to target temperature

View Solution play_arrow

- question_answer22) An X-ray has a wavelength of 0.010 A. Its momentum is [AFMC 1980; RPMT 1995; Pb. PMT 2004]

A) 2.126 × **10?23 kg-m/sec**

B) 6.626 × **10-22 kg-m/sec**

C) 3.456 × **20?25 kg-m/sec**

D) 3.313 × **10?22 kg-m/sec**

View Solution play_arrow

- question_answer23) X-rays are not used for radar purpose because

A) They are not reflected by the target

B) They are not electromagnetic waves

C) They are completely absorbed by the air

D) They sometimes damage the target

View Solution play_arrow

- question_answer24) A direct X-ray photograph of the intestines is not generally taken by the radiologists because [CPMT 1986, 88]

A) Intestines would burst on exposure to X-rays

B) The X-rays would not pass through the intestines

C) The X-rays will pass through the intestines without causing a good shadow for any useful diagnosis

D) A very small exposure of X-rays causes cancer in the intestines

View Solution play_arrow

- question_answer25) The patient is asked to drink

$BaSO_4$

for examining the stomach by X-rays because X-rays are

A) Reflected by heavy atoms

B) Refracted by heavy atoms

C) Less absorbed by heavy atoms

D) More absorbed by heavy atoms

View Solution play_arrow

- question_answer26) X-rays can be used to study crystal structure, if the wavelength lies in the range

A) 2 A to 0.1 A

B) 10 A to 5 A

C) 50 A to 10 A

D) 100 A to 50 A

View Solution play_arrow

- question_answer27) When the accelerating voltage applied on the electrons increased beyond a critical value [CPMT 1975]

A) Only the intensity of the various wavelengths is increased

B) Only the wavelength of characteristic relation is affected

C) The spectrum of white radiation is unaffected

D) The intensities of characteristic lines relative to the white spectrum are increased but there is no change in their wavelength

View Solution play_arrow

- question_answer28) The X-ray beam coming from an X-ray tube will be [IIT 1985; SCRA 1996; MP PET 1999]

A) Monochromatic

B) Having all wavelengths smaller than a certain maximum wavelength

C) Having all wavelengths larger than a certain minimum wavelength

D) Having all wavelengths lying between a minimum and a maximum wavelength

View Solution play_arrow

- question_answer29) The continuous X-rays spectrum produced by an X-ray machine at constant voltage has [DPMT 1999]

A) A maximum wavelength

B) A minimum wavelength

C) A single wavelength

D) A minimum frequency

View Solution play_arrow

- question_answer30) The penetrating power of X-rays increases with the [MP PMT 1984]

A) Increase in its velocity

B) Increase in its frequency

C) Increase in its intensity

D) Decrease in its velocity

View Solution play_arrow

- question_answer31) If

λ_1

and

λ_2

are the wavelengths of characteristic X-rays and gamma rays respectively, then the relation between them is [MP PMT 1987]

A)

$\lambda_1=1\lambda_2$

B)

$\lambda_1=\lambda_2$

C)

$\lambda_1>\lambda_2$

D)

$\lambda_1<\lambda_2$

View Solution play_arrow

- question_answer32) The wavelength

λ

of the

K_α

line of characteristic X-ray spectra varies with atomic number approximatel [MP PMT 1987]

A)

$\lambda \propto Z$

B)

$\lambda \propto Z\sqrt{}$

C)

$\lambda \propto 1Z_2$

D)

$\lambda \propto 1Z\sqrt{}$

View Solution play_arrow

- question_answer33) The minimum frequency

ν

of continuous X-rays is related to the applied potential difference V as

A)

$\nu \propto V\sqrt{}$

B)

$\nu \propto V$

C)

$\nu \propto V_{3/2}$

D)

$\nu \propto V_2$

View Solution play_arrow

- question_answer34) If V be the accelerating voltage, then the maximum frequency of continuous X-rays is given by [NCERT 1971; CPMT 1991; MP PET 2000; RPMT 2001; MP PMT 2002]

A) ehV

B) hVe

C) eVh

D) heV

View Solution play_arrow

- question_answer35) The minimum wavelength of X-rays produced by electrons accelerated by a potential difference of volts is equal to [CPMT 1986, 88, 91; RPMT 1997; RPMT 1997, 98; MP PET 1997, 98; MP PMT 1996, 98, 2003; UPSEAT 2005]

A) $eVhc$

B) $ehcV$

C) $hceV$

D) $cVeh$

View Solution play_arrow

- question_answer36) The potential difference applied to an X-ray tube is increased. As a result, in the emitted radiation [IIT 1988; ISM Dhanbad 1994; AIIMS 1997; MP PMT 1995, 2004]

A) The intensity increases

B) The minimum wavelength increases

C) The intensity decreases

D) The minimum wavelength decreases

View Solution play_arrow

- question_answer37) A potential difference of 42,000 volts is used in an X-ray tube to accelerate electrons. The maximum frequency of the X?radiations produced is [MP PMT 1993]

A) $10^{19}Hz$

B) $10^{18}Hz$

C) $10^{16}Hz$

D) $10^{20}Hz$

$(1eV=1.6\times10^{-19}J$ **and** $h=6.63\times10^{-34}J-sec)$

View Solution play_arrow

- question_answer38) Which of the following is accompanied by the characteristic X-ray emission [MP PET 1993]

A) $\alpha-$ **particle emission**

B) Electron emission

C) Positron emission

D) K?electron capture

View Solution play_arrow

- question_answer39) X-rays are known to be electromagnetic radiations. Therefore the X-ray photon has [MP PET 1993]

A) Electric charge

B) Magnetic moment

C) Both electric charge and magnetic moment

D) Neither electric charge nor magnetic moment

View Solution play_arrow

- question_answer40) X-rays of which of the following wavelengths are hardest

A) 4 A

B) 1 A

C) 0.1 A

D) 2 A

View Solution play_arrow

- question_answer41) X-ray beam can be deflected by [CPMT 2000; BHU 2001; Pb. PMT 2002]

A) Magnetic field

B) Electric field

C) Both (a) and (b)

D) None of these

View Solution play_arrow

- question_answer42) X-rays are produced due to [CPMT 1985; JIPMER 2002]

A) Break up of molecules

B) Changing in atomic energy level

C) Changing in nuclear energy level

D) Radioactive disintegration

View Solution play_arrow

- question_answer43) X-rays region lies between [CPMT 1990]

A) Short radiowave and visible region

B) Visible and ultraviolet region

C) Gamma rays and ultraviolet region

D) Short radiowave and long radiowave

View Solution play_arrow

- question_answer44) The structure of solid crystals is investigated by using [CPMT 1992; NCERT 1975; CBSEPMT 1992]

A) Cosmic rays

B) X-rays

C) Infrared radiations

D) γ–rays

View Solution play_arrow

- question_answer45) In an X-rays tube, the intensity of the emitted X-rays beam is increased by [MNR 1992; RPMT 1996; UPSEAT 2000]

A) Increasing the filament current

B) Decreasing the filament current

C) Increasing the target potential

D) Decreasing the target potential

View Solution play_arrow

- question_answer46) The binding energy of the innermost electron in tungsten is 40 keV. To produce characteristic X-rays using a tungsten target in an X-rays tube the potential difference V between the cathode and the anti-cathode should be [IIT 1985]

A) V< 40 kV

B) V $\leq$ **40 kV**

C) V > 40 kV

D) V >/< 40 kV

View Solution play_arrow

- question_answer47) In above question the energy of the characteristic X-rays given out is [IIT 1985]

A) Less than 40 keV

B) More than 40 keV

C) Equal to 40 keV

D) $\geq$ **40 keV**

View Solution play_arrow

- question_answer48) The wavelength of most energetic X-rays emitted when a metal target is bombarded by 40KeV electrons, is approximately ($h=6.62\times10^{-34}$ J-sec; 1 eV = 1.6×10^{-19} J; c = $3\times10^{8}m/s$) [MNR 1991; MP PMT 1999; UPSEAT 2000; Pb. PET 2004]

A) 300 A

B) 10 A

C) 4 A

D) 0.31 A

View Solution play_arrow

- question_answer49) X-rays which can penetrate through longer distances in substance are called [EAMCET 1983]

A) Soft X-rays

B) Continuous X-rays

C) Hard X-rays

D) None of the above

View Solution play_arrow

- question_answer50) An X-ray machine has an accelerating potential difference of 25,000 volts. By calculation the shortest wavelength will be obtained as ($h=6.62\times10^{-34}$ J?sec; e = 1.6×10^{-19} coulomb) [MP PET 1994]

A) 0.25 A

B) 0.50 A

C) 1.00 A

D) 2.50 A

View Solution play_arrow

- question_answer51) For the production of X-rays of wavelength 0.1 A the minimum potential difference will be [MP PMT 1994; RPMT 1995]

A) 12.4 kV

B) 24.8 kV

C) 124 kV

D) 248 kV

View Solution play_arrow

- question_answer52) Mosley measured the frequency (f) of the characteristic X-rays from many metals of different atomic number (Z) and represented his results by a relation known as Mosley's law. This law is (a, b are constants) [MP PMT 1994; RPMT 1996]

A) $f=a(Z-b)^2$

B) $Z=a(f-b)^2$

C)

$f^2 = a(Z - b)$

D)

$f = a(Z - b)^{1/2}$

View Solution play_arrow

- question_answer53) Penetrating power of X-rays depends on [MP PMT 1994]

A) Current flowing in the filament

B) Applied potential difference

C) Nature of the target

D) All the above

View Solution play_arrow

- question_answer54) The energy of a photon of characteristic X-rays from a Coolidge tube comes from [MP PET 1995]

A) The kinetic energy of the striking electron

B) The kinetic energy of the free electrons of the target

C) The kinetic energy of the ions of the target

D) An electronic transition of the target atom

View Solution play_arrow

- question_answer55) An X-ray tube operates on 30 kV. What is the minimum wavelength emitted

$(h = 6.6 \times 10^{-34}$

Js,

$e = 1.6 \times 10^{-19}$

Coulomb,

$c = 3 \times 10^8$

ms?1) [MP PMT 1995; DPMT 2001, 03]

A) 0.133 A

B) 0.4 A

C) 1.2 A

D) 6.6 A

View Solution play_arrow

- question_answer56) The wavelength of the most energetic X?ray emitted when a metal target is bombarded by 100 KeV electrons is approximately [MP PET 1996]

A) 12 A

B) 4

C) 0.31 A

D) 0.124 A

View Solution play_arrow

- question_answer57) An electron beam in an X-ray tube is accelerated through a potential difference of 50000 volts. These are then made to fall on a tungsten target. The shortest wavelength of the X-ray emitted by the tube is [MP PET 1997]

A) 2.5 A

B) 0.25 nm

C) 0.25 cm

D) 0.025 nm

View Solution play_arrow

- question_answer58) For harder X-rays [MP PET 1997]

A) The wavelength is higher

B) The intensity is higher

C) The frequency is higher

D) The photon energy is lower

View Solution play_arrow

- question_answer59) When cathode rays strike a metal target of high melting point with very high velocity, then [MP PMT 1997; AIIMS 1999]

A) X-rays are produced

B) Ealpha-rays are produced

C) TV waves are produced

D) Ultrasonic waves are produced

View Solution play_arrow

- question_answer60) Penetrating power of X-rays can be increased by [MP PMT 1997, 2000]

A) Increasing the potential difference between anode and cathode

B) Decreasing the potential difference between anode and cathode

C) Increasing the cathode filament current

D) Decreasing the cathode filament current

View Solution play_arrow

- question_answer61)

K_α characteristic X-ray refers to the transition [MP PMT 1999]

A) $n=2$ **to** $n=1$

B) $n=3$ **to** $n=2$

C) $n=3$ **to** $n=1$

D) $n=4$ **to** $n=2$

View Solution play_arrow

- question_answer62) X-rays are produced in X-ray tube operating at a given accelerating voltage. The wavelength of the continuous X-rays has values from [IIT 1998; BVP 2003]

A) 0 to ∞

B) λ_{min} **to** ∞ **, where** $\lambda_{min}>0$

C) 0

to λ_{max} **where** $\lambda_{max}<\infty$

D) **to** λ_{min} **to** λ_{max} **, where 0 <** $\lambda_{min}<\lambda_{max}<\infty$

View Solution play_arrow

- question_answer63) The wavelength of X-rays is [EAMCET (Med.) 1995]

A) 2000 A

B) 2 A

C) 1 mm

D) 1 cm

View Solution play_arrow

- question_answer64) The ratio of the energy of an X-ray photon of wavelength 1 A to that of visible light of wavelength 5000 A is [EAMCET (Med.) 1995]

A) 1: 5000

B) 5000 : 1

C) 1 :25

D) $\frac{25\times}{106}$

View Solution play_arrow

- question_answer65) According to Mosley's law, the frequency of a spectral line in X-ray spectrum varies as [EAMCET (Med.) 1995; Pb. PMT 1999]

A) Atomic number of the element

B) Square of the atomic number of the element

C) Square root of the atomic number of the element

D) Fourth power of the atomic number of the element

View Solution play_arrow

- question_answer66) For the structural analysis of crystals, X-rays are used because [IIT 1992; JIPMER 2000]

A) X-rays have wavelength of the order of interatomic spacing

B) X-rays are highly penetrating radiations

C) Wavelength of X-rays is of the order of nuclear size

D) X-rays are coherent radiations

View Solution play_arrow

- question_answer67) The essential distinction between X-rays and

$\gamma-$

rays is that [BHU 1994; RPMT 1991; JIPMER 2001, 02]

A)

$\gamma-$

rays have smaller wavelength than X-rays

B)

$\gamma-$

rays emanate from nucleus while X-rays emanate from outer part of the atom

C)

$\gamma-$

rays have greater ionizing power than X-rays

D)

$\gamma-$

rays are more penetrating than X-rays

View Solution play_arrow

- question_answer68) The minimum wavelength of the X-rays produced by electrons accelerated through a potential difference of V volts is directly proportional to [CBSE PMT 1996]

A) $V\sqrt{}$

B) V_2

C) $1/V\sqrt{}$

D) $1/V$

View Solution play_arrow

- question_answer69) What determines the hardness of the X-rays obtained from the Coolige tube [RPMT 1996]

A) Current in the filament

B) Pressure of air in the tube

C) Nature of target

D) Potential difference between cathode and target

View Solution play_arrow

- question_answer70) The most penetrating radiation out of the following is [CBSE PMT 1997]

A) X-rays

B) β **-rays**

C) $\alpha-$ **particles**

D) $\gamma-$ **rays**

View Solution play_arrow

- question_answer71) On increasing the number of electrons striking the anode of an X-ray tube, which one of the following parameters of the resulting X-rays would increase [SCRA 1998; DPMT 2000]

A) Penetration power

B) Frequency

C) Wavelength

D) Intensity

View Solution play_arrow

- question_answer72) What kV potential is to be applied on X-ray tube so that minimum wavelength of emitted X-rays may be 1A ($h=6.625\times10^{-34}$ J-sec) [UPSEAT 1999]

A) $12.42kV$

B)

12.84kV

C)

11.98kV

D)

10.78kV

View Solution play_arrow

- question_answer73) X-rays cannot be deflected by means of an ordinary grating due to [Pb. PMT 1999; MH CET 2000; BCECE 2004]

A) Large wavelength

B) High speed

C) Short wavelength

D) None of these

View Solution play_arrow

- question_answer74) Consider the following two statements A and B and identify the correct choice in the given answer A: The characteristic X-ray spectrum depends on the nature of the material of the target. B: The short wavelength limit of continuous X-ray spectrum varies inversely with the potential difference applied to the X-rays tube [EAMCET (Med.) 2000]

A) A is true and B is false

B) A is false and B is true

C) Both A and B are true

D) Both A and B are false

View Solution play_arrow

- question_answer75) The energy of an X- ray photon of wavelength 1.65 A is

$(h=6.6\times10^{-34}J\text{-}sec, c=3\times10^{8}ms^{-1}$

,

$1eV=1.6\times10^{-19}J)$

[EAMCET (Engg.) 2000]

A) 3.5 keV

B) 5.5 keV

C) 7.5 keV

D) 9.5 keV

View Solution play_arrow

- question_answer76) If λ =10A, then it corresponds to [DCE 2000]

A) Infra-red

B) Microwave

C) Ultra-violet

D) X-rays

View Solution play_arrow

- question_answer77) Bragg?s law for X-rays is [UPSEAT 2001]

A) d sin θ = $2n\lambda$

B) $2d\sin\theta=n\lambda$

C) $n\sin\theta=2\lambda d$

D) None of these

View Solution play_arrow

- question_answer78) The X-rays produced in a coolidge tube of potential difference 40V have minimum wavelength of [MH CET (Med.) 2001]

A) $3.09\times10^{-8}m$

B) $5.09\times10^{8}m$

C) $4.09\times10^{-8}m$

D) $1.09\times10^{8}m$

View Solution play_arrow

- question_answer79) For the production of X-rays, the target should be made of [BHU 2000; CPMT 2001]

A) Steel

B) Copper

C) Aluminum

D) Tungsten

View Solution play_arrow

- question_answer80) Intensity of X-rays depends upon the number of [SCRA 1998; DPMT 2000; AFMC 2001]

A) Electrons

B) Protons

C) Neutrons

D) Positrons

View Solution play_arrow

- question_answer81) In an X-ray tube electrons bombarding the target produce X-rays of minimum wavelength 1 A. What must be the energy of bombarding electrons [KCET 2001]

A) 13375 eV

B) 12375 eV

C) 14375 eV

D) 15375 eV

View Solution play_arrow

- question_answer82) If energy of K-shell electron is ? 40000 eV and If 60000 V potential is applied at coolidge tube then which of the following X-ray will get form [RPET 2001]

A) Continuous

B) White X-rays

C) Continuous and all series of characteristic

D) None of these

View Solution play_arrow

- question_answer83) For production of characteristic

K_β

X-rays, the electron transition is [MP PET 2001]

A)

$n=2 to n=1$

B)

$n=3 to n=2$

C)

$n=3 to n=1$

D)

$n=4 to n=2$

View Solution play_arrow

- question_answer84) Penetrating power of X-rays does not depend on [MP PET 2001]

A) Wavelength

B) Energy

C) Potential difference

D) Current in the filament

View Solution play_arrow

- question_answer85) The potential difference applied to an X-ray tube is 5kV and the current through it is 3.2 mA. Then the number of electrons striking the target per second is [IIT-JEE (Screening) 2002]

A)

2×10^{16}

B)

5×10^{16}

C)

1×10^{17}

D)

4×10^{15}

View Solution play_arrow

- question_answer86) For the production of characteristic

K_{γ},

X-ray, the electron transition is [BHU 2002]

A)

$n=2 to n=1$

B)

$$n=3 \text{ton}=2$$

C)

$$n=3 \text{ton}=1$$

D)

$$n=4 \text{ton}=1$$

View Solution play_arrow

- question_answer87) When X rays pass through a strong uniform magnetic field, Then they [MP PET 2002; RPMT 2002, 03]

A) Do not get deflected at all

B) Get deflected in the direction of the field

C) Get deflected in the direction opposite to the field

D) Get deflected in the direction perpendicular to the field

View Solution play_arrow

- question_answer88) If the potential difference applied across X-ray tube is V volts, then approximately minimum wavelength of the emitted X-rays will be [MP PET 2002; RPMT 1995; CBSE PMT 1996]

A)

$$1227V\sqrt{AA}$$

B)

$$1240VAA$$

C)

$$2400VAA$$

D)

$$12400VAA$$

View Solution play_arrow

- question_answer89) What is the difference between soft and hard X-rays [MP PMT 2002; AIIMS 2002]

A) Velocity

B) Intensity

C) Frequency

D) Polarization

View Solution play_arrow

- question_answer90) X-ray will travel minimum distance in [MP PET 2003]

A) Air

B) Iron

C) Wood

D) Water

View Solution play_arrow

- question_answer91) The minimum wavelength of X-ray emitted by X-rays tube is 0.4125 A. The accelerating voltage is [BHU 2003; CPMT 2004; MP PMT 2005]

A) 30 kV

B) 50 kV

C) 80 kV

D) 60 kV

View Solution play_arrow

- question_answer92) Characteristic X-rays are produced due to [AIIMS 2003]

A) Transfer of momentum in collision of electrons with target atoms

B) Transition of electrons from higher to lower electronic orbits in an atom

C) Heating of the target

D) Transfer of energy in collision of electrons with atoms in the target

View Solution play_arrow

- question_answer93) X-rays when incident on a metal [BCECE 2003; RPMT 2003]

A) Exert a force on it

B) Transfer energy to it

C) Transfer pressure to it

D) All of the above

View Solution play_arrow

- question_answer94) The minimum wavelength of X-rays produced in a coolidge tube operated at potential difference of 40 kV is [BCECE 2003; RPET 2002, 03]

A) 0.31 A

B) 3.1 A

C) 31 A

D) 311 A

View Solution play_arrow

- question_answer95) The potential difference between the cathode and the target in a Collidge tube is 100 kV. The minimum wavelength of the X-rays emitted by the tube is [Pb. PMT 2004]

A) 0.66 A

B) 9.38 A

C) 0.246 A

D) 0.123 A

View Solution play_arrow

- question_answer96) X-rays are produced by accelerating electrons by voltage V and let they strike a metal of atomic number Z. The highest frequency of X-rays produced is proportional to [UPSEAT 2004]

A) V

B) Z

C) (Z ? 1)

D) $(Z-1)^2$

View Solution play_arrow

- question_answer97) If the operating potential of an X-ray tube is 50 kV, the velocity of X-rays coming out of it is [RPMT 2003]

A) $4\times10^4 m/s$

B) $3\times10^8 m/s$

C) $10^8 m/s$

D) $3m/s$

View Solution play_arrow

- question_answer98) If the voltage of X-ray tube is doubled, the intensity of X-rays will become [RPMT 2003]

A) Half

B) Unchanged

C) Double

D) Four times

View Solution play_arrow

- question_answer99) If the minimum wavelength obtained in an X-ray tube is

$$2.5\times10^{-10}\text{m}$$

, the operating potential of the tube will be [RPMT 2003]

A) 2 kV

B) 3 kV

C) 4 kV

D) 5 kV

View Solution play_arrow

- question_answer100) The wavelength of X-rays decreases, when [RPMT 2002]

A) Temperature of target is increased

B) Intensity of electron beam is increased

C) K.E. of electrons striking the target is increased

D) K.E. of electrons striking the target is decreased

View Solution play_arrow

- question_answer101) X-rays are produced in laboratory by [RPMT 1998]

A) Radiation

B) Decomposition of the atom

C) Bombardment of high energy electron on heavy metal

D) None of these

View Solution play_arrow

- question_answer102) In vacuum an electron of energy 10 keV hits tungsten target, then emitted radiation will be [RPMT 2001]

A) Cathode rays

B) X-rays

C) Infrared rays

D) Visible spectrum

View Solution play_arrow

- question_answer103) X-rays of

$\lambda=1AA$

have frequency [DCE 1998]

A)

$3\times10^{8}Hz$

B)

$3\times10^{18}Hz$

C)

$3\times10^{10}Hz$

D)

$3\times10^{15}Hz$

View Solution play_arrow

- question_answer104) Solid targets of different elements are bombarded by highly energetic electron beams. The frequency (f) of the characteristic X-rays emitted from different targets varies with atomic number Z as [AIIMS 2005]

A)

$f\propto Z\sqrt{}$

B)

$f\propto Z^{2}$

C)

$f\propto Z$

D)

$f\propto Z^{3/2}$

View Solution play_arrow

- question_answer105) Compton effect shows that [DPMT 1995]

A) X-rays are waves

B) X-rays have high energy

C) X-rays can penetrate matter

D) Photons have momentum

View Solution play_arrow

- question_answer106) An X-ray tube with a copper target emits Cu

$$K_\alpha$$

line of wavelength 1.50 A. What should be the minimum voltage through which electrons are to be accelerated to produce this wavelength of X rays

$$(h=6.63\times10^{-34}\text{J-sec},\ c=3\times10^{8}\text{m/s})$$

[Orissa JEE 1996]

A) 8280 V

B) 828 V

C) 82800 V

D) 8.28 V

View Solution play_arrow

- question_answer107) In X-ray spectrum wavelength l of line

$$K_\alpha$$

depends on atomic number Z as [RPMT 1995; DCE 2002]

A)

$$\lambda \propto Z_2$$

B)

$$\lambda \propto (Z-1)^2$$

C)

$$\lambda \propto 1(Z-1)$$

D)

$$\lambda \propto 1(Z-1)^2$$

View Solution play_arrow

- question_answer108) Absorption of X-ray is maximum in which of the following different sheets [RPMT 1995]

A) Copper

B) Gold

C) Beryllium

D) Lead

View Solution play_arrow

- question_answer109) The wavelength of K_α line in copper is 1.54 A. The ionisation energy of K electron in copper in Joule is [EAMCET 1984]

A) 11.2×10^{-27}

B) 12.9×10^{-16}

C) 1.7×10^{-15}

D) 10×10^{-16}

View Solution play_arrow

- question_answer110) The wavelength of K_α line for an element of atomic number 43 is l. Then the wavelength of K_α line for an element of atomic number 29 is

A) 4329λ

B) 4228λ

C) 94λ

D) 49λ

View Solution play_arrow

- question_answer111) In X-ray experiment Ka, Kb denotes [DCE 2005]

  A) Characteristic

  B) Continuous wavelength

  C) a, b-emissions respectively

  D) None of these