Question 2

The size of a bacteria is 1 μ. Find the number of bacteria in 1m length.

Answer

Given,

Size of a bacteria = 1 μ

Total length = 1m

∴ Number of bacteria in 1m length = 1m /1μ

As we know, 1 μ = 10-6m, substituting the value in the relation above we get:

Number of bacteria in 1m length = 1m /10^{-6}m

Hence,

number of bacteria in 1m length = 10^6 bacteria.

Question 3

The distance of a galaxy from the earth is 5.6 x 1025m. Assuming the speed of light to be

3 x 10^8 ms-1, find the time taken by light to travel this distance.

Hint —Time taken = distance travelled / speed

Answer

Given,

Time taken = distance travelled / speed

distance = 5.6 x 1025m

speed = 3 x 10^8 ms-1

Substituting the values in the formula above we get,

Time taken = 5.6 ×10^{25} m / 3×108

⇒Time taken = 1.87 ×10^{17}s

∴, time taken by light = 1.87 x 10^{17}s.

Question 4

The wavelength of light is 589nm. What is its wavelength in Å?

Answer

As we know, 1nm = 10 Å

Given,

The wavelength of light = 589nm

Substituting the value of wavelength in the relation above, we get,

1nm =10A˚

589nm=589×10A˚

⇒589nm = 5890 A˚

Hence, the wavelength of light in Å is 5890 Å.

Question 5

The distance of the nearest star, Proxima Centauri, from the Earth is 4.0 x 1013 km. Express it in light year.

Answer

1 Light year = 9.46 x 1012 km

or 9.46 x 1012 km = 1 Light year

∴ 4.0 x 1013 km

= 1 / 19.46×10^{12} x 4.0 x 10^{13}

= 4.2 light years.

Hence, distance of the nearest star from earth = 4.2 light years.

Question 6

It takes time 8 min for light to reach from the sun to the earth surface. If speed of light is taken to be 3 x 108ms-1, find the distance from the sun to the earth in km.

Answer

As we know, Distance = speed x time

Given,

Speed = 3 x 10^8ms-1

Time = 8 min = 8 x 60s = 480s

Substituting the values in the formula above we get,

Distance = 3 x 10^8 x 480 = 1440 x 10^8 m.

Converting the distance to km:

Distance in km = 1440×10^8 / 1000km

= 1440×10^8 km

∴,the distance from the sun to the earth is 1.44 x 108 km.

Question 7

'The distance of a star from the earth is 8.33 light minutes'. What do you mean by this statement? Express the distance in metre.

Answer

'The distance of a star from the earth is 8.33 light minutes' implies, it takes 8.33 minutes for light to reach the earth from the star.

As we know,

Distance = speed x time

Given,

Speed = 3 x 10^8ms-1

Time = 8.33 min

= 8.33 x 60s

= 499.8s

≈ 500s

Substituting the values in the formula above we get,

Distance = $3 \times 10^8 \times 500$

$= 1500 \times 10^8$

$= 1.5 \times 10^{11}$

∴, the distance from the star to the earth is 1.5×10^{11} m.