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**Assignment – I**

1. The atomic number of an element is 5 and mass number is 11. Find the number of electrons, protons and neutrons present in an atom of it. How can this element be represented ?
2. The electronic configuration of a dipositive ion M2+ is 2, 8, 14 and its atomic mass is 56. What is the number of neutrons in its nucleus ?
3. Calculate the number of protons, neutrons and electrons in 35Br80.
4. The number of electrons, protons and neutrons in a species are equal to 18, 16 and 16 respectively. Assign the proper symbol of the species.
5. An element with mass number 81 contains 31.7% more neutrons as compared to protons. Find symbol of the element. [Ans : 35Br]
6. Complete the following table :

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Particle | Atomic no.  (Z) | Mass no.  (A) | No. of electrons  (e) | No. of protons  (p) | No. of neutrons  (n) |
| F | 9 | …… | …… | …… | 10 |
| Mg2+ | …… | 24 | …… | 12 | …… |
| S | …… | 32 | …… | 16 | …… |
| P3- | …… | ….. | 18 | …… | 16 |

1. There are 14 protons and 13 neutrons in the nucleus of an atom. What is its mass number? [Ans : 27]
2. Indicate the no. of electrons, protons and neutrons in the element 19K39. [Ans : e = 19, p = 19, n =20]
3. What is common in the isotopes of an element ? [Ans : same atomic number]
4. From the following nuclei, choose the isotopes and isobars :

a) 8p + 8n b) 8p + 9n c) 18p + 22n d) 20p + 20n [Ans :Isotopes : (a) & (b), Isobars : (c) & (d)]

1. How are the following species related ? 6C14 , 7N15 , 8O16 [Ans : These are isotones]
2. Give example of each of the following :

a) Isotope of 17Cl35 b) Isobar of 18Ar80 c) Isotone of 7N15 [Ans : a) 17Cl37 b) 20Ca40 c) 8O16 ]

1. The atomic number of cation M2+ is 12. How many electrons are present in it ? [Ans : 10]
2. How are Cl – and S2- ions related to each other ? [Ans : These are isoelectronic]
3. Which isotope of hydrogen is called protium ? [Ans : 1H1]
4. Which particles determine the mass of an atom ? [Ans : protons, neutrons]

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**Assignment – II**

1. The Vividh Bharati station broadcasts on a frequency of 1368 KHz. Calculate the wavelength of electromagnetic radiation emitted by the transmitter. [Ans : 219.3 m]
2. A sodium street light gives off yellow light that has a wavelength of 589 nm. What is the frequency of this light ? [Ans : 5.093 x 1014 s-1]
3. At the closest approach, the distance between Mars and Earth is found to be 58 million Km. When the planets are at this closest distance, how long would it take to send a radio message from a space probe of mars to earth ? [Ans : 193.3 s]
4. Calculate and compare the energies of two radiations one with wavelength 800 pm and the other with wavelength 400 pm. [Ans : E2 = 2 E1]
5. Calculate the energy of one mole photons of radiations whose frequency is 5 x 1010 s-1. [Ans : 19.93 J]
6. Calculate : a) Wave number b) Frequency of yellow radiations having wavelength 5800 Å

[Ans : a) 1.724 x 106 m-1 , b) 5.172 x 1014 s-1]

1. A 100 watt bulb emits monochromatic light of wavelength 400 nm. Calculate the number of photons emitted per second by the bulb. [Ans : 2.012 x 1020]
2. Calculate the frequency, wave number and energy associated with photon of radiations having wavelength 6000 Å. [Ans : 5 x 1014 s-1 , 1.6 x 106 m-1 , 33.1 x 10-20 J]
3. The frequency of an electromagnetic radiation is 1556 KHz. What is the wavelength? [Ans : 192.8 m]
4. The wavelength of a violet radiation is 3.7 x 105 pm. What is its frequency? [Ans : 8.1 x 1014 s-1]
5. The wavelength of blue light is 480 nm. Calculate the frequency and wave number of this light.

[Ans : ν = 6.25 x 1014 s-1 , ῡ = 2.08 x 106 m]

1. The wavelength of visible spectrum extends from violet (400 nm) to red (750 nm). Express the corresponding frequency ranges. [Ans : 7.5 x 1014 Hz to 4.0 x 1014 Hz]
2. Calculate the Einstein energy when the frequency of photon is 1010 KHz. [Ans : 39.87 x 102 J]
3. A photon of light with wavelength 700 nm has energy E. A photon of light of what wavelength would correspond to energy 2E ? [Ans : 350 nm]
4. What is the ratio between energies of two radiations one with wavelength 6000 Å and the other with wavelength 2000 Å ? [Ans : E2 = 3 E1]

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**Assignment – III**

1. In a photoelectric effect experiment, irradiation of a metal with light of frequency 5.2 x 1014 s-1 yields electrons with maximum kinetic energy 1.3 x 10-19 J. Calculate the threshold frequency (ν0)for the metal.

[Ans : 3.24 x 1014 s-1]

1. Light of wavelength 5000 Å falls on a metal surface of work function 1.9 eV. Find : a) the energy of photons b) kinetic energy of photoelectrons. [Ans : a) 3.97 x 10-19 J b) 9.3 x 10-20 J]
2. Let a light of wavelength ‘λ’ and intensity ‘I’ strike a metal surface to emit ‘x’ electrons per second. Average kinetic energy of each electron is ‘Y’ unit. What will happen to ‘x’ and ‘Y’ when :

a) λ is halved b) Intensity ‘I’ is doubled ?

1. When electromagnetic radiation of wavelength 300 nm falls on the surface of sodium, electrons are emitted with kinetic energy of 1.68 x 105 J mol­-1. What is the minimum energy needed to remove an electron from sodium? What is the maximum wavelength that will cause a photoelectron to be emitted?

[Ans : a) 3.84 x 10-19 J, b) 5.17 x 10-7 m]

1. When a certain metal was irradiated with light of frequency 1.6 x 1016 Hz, the photoelectrons emitted had twice the kinetic energy as photoelectrons emitted when the same metal was irradiated with light of frequency 1.0 x 1016 Hz. Calculate the threshold frequency (ν0)for the metal. [Ans : 4 x 1015 Hz]
2. Calculate the energy of one mole photons of radiations with frequency equal to 5 x 1014 Hz.

[Ans : 199.51 KJ mol-1]

1. Maximum K.E of the photoelectrons is found to be 6.63 x 10-19 J. When the metal is irradiated with a radiation of frequency 2 x 1015 Hz, what is the threshold frequency of the metal. [Ans : 1 x 1015 s-1]
2. Photoelectric emission is observed from a metal surface for frequencies ν1 and ν2 incidents radiations (ν1 > ν2). If the maximum kinetic energy of the two electrons are in the ratio 1 : 2, then how is threshold frequency (ν0) expressed. [Ans : 2 ν1 - ν2 ]
3. Threshold frequency of a metal is 5 x 1013 s-1 out of which 1 x 1014 s-1 frequency light is focused. Calculate the maximum K.E emitted by the electron. [Ans : 3.3 x 10-20 J]

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**Assignment – IV**