

- 1). Cathode rays are stream of electrons.
2. Minimum energy required to move the electron from its ground state to infinity is known as ionisation power .
It is given by $13.6z^2$ eV
where (z^2 denotes z square) z is atomic no
3. When alpha rays strike a thin gold foil then most of the alpha rays pass through without any deviation.
4. Atomic number is equal to the number of protons in the nucleus.
5. Charge on a positron is equal to that of proton.
6. An atom differs from its ion in number of electrons.
8. Rutherford's scattering experiment is related to the size of the nucleus.
9. The number of nodal planes in a p_x orbital is one.
10. The energy of red photon is less than the energy of violet photon.
11. Atomic number of an atom represents number of protons in the nucleus.
12. Radius of Bohr's orbit of hydrogen atom is 0.53 Å.
13. Rutherford's alpha ray scattering experiment showed for the first time that the atom has Nucleus.
15. The last 's' orbital of Mg has 2 paired electrons. so the valence electrons are paired in the 3s subshell. No valence electrons are unpaired here.

16. Convert angstrom to metres :

$$5000 \times 10^{-10} = 5 \times 10^{-7} \text{ m}$$

$$h = 6.62 \times 10^{-34}$$

$$C = 3 \times 10^8$$

$$Y = 5 \times 10^{-7} \text{ m}$$

$$E = h(C/Y)$$

Doing the substitution :

$$E = 6.62 \times 10^{-34} (3 \times 10^8 \div 5 \times 10^{-7}) = 3.972 \times 10^{-19} \text{ Joules}$$

$$1 \div (3.972 \times 10^{-19}) = 2.5 \times 10^{18} \text{ Photons}$$

$$19. E=340\text{eV}$$

$$E=13.6 \frac{z^2}{n^2}$$

for, $n=1$

$$340=13.6 \frac{(z^2)}{1^2}$$

$$z^2 = 3400/13.6$$

$$z = \sqrt{25}$$

$$= 5$$

Element with atomic number 5 is Boron.

LEVEL 2

- 1). The atomic number of an element is determined by the number of protons in one atom.
2. The valency of an element is the number of atoms of hydrogen combining with 1 atom of the given element.
3. Isotopes have same chemical properties and different physical properties.
4. The relative atomic masses of many elements are not whole numbers because of the existence of isotopes.
5. A proton is identical to the nucleus of a hydrogen atom.
6. The number of electrons in the outer shell of the most stable of inert atoms is 8
7. All noble gasses including Neon has a valency equal to zero.
8. For an element with atomic number 19, the 19th electron will occupy N-shell.
9. A natural phenomenon that supports the experimental conclusion that atoms are divisible is radioactivity.
12. The e/m value of positive particles depends on the gas taken in the discharge.
13. Neutron has no charge so it cannot be deflected under the presence of electric field
15. An Atom becomes ion when it carries a charge on itself by losing or gaining electron.
16. The principal quantum number increases, the difference of energy between consecutive energy levels decreases.
17. Two elements A, B have same number of valence electrons in their atom have similar chemical properties.
18. Element with 19 electrons in its ground state will be having electronic configuration of 2,8,8,1. So it will be having 1 electron in its valence shell.

20. Element with Mass number 27 and having 14 neutrons consist of 13 protons. So its electronic configuration will be 2,8,3. It will be having 3 electrons in M shell

23. Nucleons means the subparticles present in Nucleus i.e Protons and Neutrons. Mass number is nothing but total number of Protons and Neutrons.

Level 3

3). Characteristics of cathode rays depend upon the nature of gas present in the cathode ray tube.

4. The mass of proton is almost equal to the mass of the mass of Neutron.

5. Overall Neutrality of atom could be explained correctly by Thomson Model of atom.

6. The two electrons present in the 2s orbital have spin quantum numbers but of opposite sign.

12. Let a,b, c be the relative abundances of three isotopes having mass numbers M, (M+1) and (M+2) respectively.

$$\frac{aM+b(M+1)+c(M+2)}{a+b+c}=M+0.5$$

$$aM+bM+b+cM+2c=aM+bM+cM+0.5a+0.5b+0.5c$$

$$0.5b+1.5c=0.5a$$

$$b+3c=a$$

This is true for the option (B) a:b:c=4:1:1

13. In Gallium 4p is the highest occupied level, so this gives

4,1, ml, ms

where ml can be -1, 0 or 1 and ms can be -1/2 or +1/2.

14. An atom has four unpaired electrons. The total spin of this atom will be 2

15. Isosters are either of a group of molecules or ions that have the same number of atoms and the same number of valence electrons. So B option is correct.

16. Third group element is right answer.

As you can see the difference of 3rd and 4th ionization energy is huge as compared to other consecutive ionization energy, also the element attain noble gas configuration when 3 electron are taken and the ionization energy of noble gas is much much higher than compared to other neighbor atom .

17. 1 g requires 33 J

so 10 g will require 330 J heat

$$\text{Total quanta} = E = hv = 6.62 \times 10^{-34} \times 4.67 \times 10^{14}$$

$$= 30.91 \times 10^{-20}$$

$$10 \text{ g of ice will require} = \frac{330}{30.91 \times 10^{-20}}$$

$$= 1.065 \times 10^{22}$$

18. ns^2np^5 configuration represents the most electronegative element as after gaining one electron it becomes more stable (inert gas configuration) [electronegativity is the tendency of attracting electron]. Fluorine (atomic number 9) is the most electronegative element. Its electronic configuration is $1s^22s^22p^5$. It is a halogen.
19. The Valence electron in the element should be 3 because as from the given data it can be understood that removing the 4th electron requires greater amount of energy than all the previous IE's which depicts that after removing 3 electron the element have attained the stable configuration and it will require more energy to remove an electron in the stable configuration.
22. The e/m value for the positive rays is maximum for hydrogen.
23. In the Bohr's model of atom the electron in an energy level emits or absorbs energy only when it changes its energy level.
25. An orbital is the space around the nucleus where the probability of finding the electron is maximum.
26. Radius of orbit of an electron and velocity of electron are inversely proportional to each other.

