# DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

**Solutions**

SUBJECT : CHEMISTRY
DPP No. : 10

## Topic :- STRUCTURE OF ATOM

1 **(d)**

The values of quantum number will give idea about the last subshell of element. From that value we can find the atomic number of element, $n = 3$ means 3rd-shell

$\left.\begin{matrix} l = 0 \\ m = 0 \end{matrix}\right\}$means subshell

It means it is $3s$-subshell which can have 1 or 2 electrons.

$\therefore$ Configuration of element is

$1s^2, 2s^2, 2p^6, 3s^{1-2}$

$\therefore$ Atomic *i.e.*, number is 11 or 12.

2 **(a)**

$hv =$ work function $+KE$;

or $hv = hv_0 + KE$;

$hv_0 =$ work function $= \frac{hc}{\lambda_0}$;

where $\lambda_0$ is threshold wavelength.

3 **(a)**

The Sc atom has $3d^1, 4s^2$ configuration.

4 **(a)**

Wave number of spectral line in emission spectrum of hydrogen,

$$\bar{v} = R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) \qquad ...(i)$$

Given, $\bar{v} = \frac{8}{9}R_H$

On putting the value of $\bar{v}$ in Eq. (i), we get

$$\frac{8}{9} = R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

$$\frac{8}{9} = \frac{1}{(1)^2} - \frac{1}{n_2^2}$$

$$\frac{8}{9} - 1 = -\frac{1}{n_2^2}$$

$$\frac{1}{3} = \frac{1}{n_2}$$

$\therefore \quad n_2 = 3$

Hence, electron jumps from $n_2 = 3$ to $n_1 = 1$

5 **(b)**

J.J. Thomson (1987) was first experimentally demonstrated particle nature of electron. It was first of all proposed by Millikan's oil drop experiment.

6 **(b)**

Angular momentum for $n$ and $(n+1)$ shells are $\frac{nh}{2\pi}$ and $(n+1)\frac{h}{2\pi}$.

7 **(b)**

The volume of nucleus : volume of atom, $\frac{4}{3}\pi r_n^3 : \frac{4}{3}\pi r^3$ atom.

8 **(c)**

$O^{2-}$ has 10 electrons but 8 neutrons ( ${}_8O^{16}$).

10 **(c)**

Possible mol. wt. may be 18,20,19,20,22,21 respectively for $H^1H^1O^{16}$,$H^2H^2O^{16}$,$H^1H^2O^{16}$,$H^1H^1O^{18}$,$H^2H^2O^{18}$,$H^1H^2O^{18}$ .

11 **(c)**

Magnetic moment $= \sqrt{[n(n+2)]}$ where $n$ is number of unpaired electrons .

12 **(d)**

Hertz for the first time noticed the effect.

13 **(b)**

Cr (24):[Ar]$3d^5 4s^1$

$Cr^{3+}$:[Ar]$3d^3 4s^0$

14 **(d)**

A part of energy of photon ($h\nu$-work function) is used for kinetic energy of electrons.

15 **(b)**

$$\frac{e}{m} \text{ for electron } (e) = \frac{1.6 \times 10^{-19}}{9.1 \times 10^{-28}}$$
$$= 1.758 \times 10^8$$
$$\frac{e}{m} \text{ for proton } (p) = \frac{1.6 \times 10^{-19}}{1.672 \times 10^{-24}}$$
$$= 9.56 \times 10^4$$
$$\frac{e}{m} \text{ for neutron } (n) = \frac{0}{1.675 \times 10^{-24}} = 0$$
$$\frac{e}{m} \text{ for } \alpha - \text{particle} = \frac{2}{4} = 0.5$$

Hence, the increasing order of $\frac{e}{m}$ is as

$n < \alpha < p < e$

16 **(d)**

Ionisation energy of nitrogen =energy of photon

$$= Nh\frac{c}{\lambda}$$

where, $N = 6.02 \times 10^{23}$

$c = 3 \times 10^8 \text{ms}^{-1}$

$\lambda = 854\ \text{Å} = 854\ \times 10^{-10}\text{m}$

$$= \frac{6.02 \times 10^{23} \times 6.6 \times 10^{-34} \times 3 \times 10^{8}}{854 \times 10^{-10}}$$

$= 1.4 \times 10^{6}\ \text{J mol}^{-1}$

$= 1.4 \times 10^{3}\ \text{kJ mol}^{-1}$

17 **(a)**

$e/m$ for proton $= \frac{1}{1}; e/m$ for $\alpha = \frac{2}{4}$

18 **(a)**

$$E = n\frac{hc}{\lambda}$$

$h = 6.6 \times 10^{-34}$ Js or $1\text{J} = \dfrac{n \times 6.6 \times 10^{-34} \times 3 \times 10^{8}}{4000 \times 10^{-10}}$

19 **(c)**

We know that the energy is emitted in the form of quanta and is given by,

$$\Delta E = h\nu = \frac{hc}{\lambda}$$

or $\lambda = \frac{hc}{\Delta E}$

$$= \frac{6.62 \times 10^{-27} \times 3 \times 10^{10}}{3 \times 1.6 \times 10^{-12}}$$

$= 4.14 \times 10^{-5}$ cm

$= 4140$ Å

| ANSWER-KEY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Q. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **A.** | D | A | A | A | B | B | B | C | D | C |
| | | | | | | | | | | |
| Q. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| **A.** | C | D | B | D | B | D | A | A | C | B |
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