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St. Lawrence High School



A JESUIT CHRISTIAN MINORITY INSTITUTION

FIRST TERM 2018

Subject - Physical Science

Date:- 24/04/18

Class - IX

Full Marks : 75

Time:-

2hr30min

SECTION - A

I. Choose the correct Option :

(1X10=10)

- ^{Newton}
1. Newton is a —
a. fundamental unit b. derived unit c. number d. none of them
2. Light year indicates —
a. time b. distance c. a phenomenon of light energy d. displacement
3. X-ray unit is
a. 10^{-3} m b. 10^{-13} m c. 10^{-9} m d. 10^{-12} m
4. The value of Avogadro's number is —
a. 6.230×10^{23} b. 6.022×10^{23}
c. 6.022×10^{-23} d. 5.62×10^{20}
5. 2, 8, 2 is the electric configuration of —
a. Na b. Mg c. Cl d. Al
6. $^{35}_{17}\text{Cl}$ and $^{37}_{17}\text{Cl}$ pair is known as
a. Isotope b. isotone c. isotear d. neutrons
7. The unit in which the actual mass of an atom of an element is expressed is -
(a) kg (b) a. m. u. (c) cm (d) mm
8. ^{Roy}
 X_{λ} -particle is -
a. electron
b. doubly charged helium ion.

- c. proton
d. none of these
9. Neutron is discovered by -
(a) Ruther Ford (b) Chadwick (c) Bohr (d) Neuiton
10. $^{24}_{12}\text{Mg}$, mass number of it is -
(a) 12 (b) 36 (c) 24 (d) 10

SECTION - B

II. Fill in the blanks :-

(1x10=10)

- a) A _____ quantity is expressed as a combination of several fundamental quantity.
- b) Volume is a _____ physical quantity.
- c) The S.I. unit of velocity is _____.
- d) The movement of a pendulum is an example of _____ motion.
- e) The particles present within the nucleus is called as _____.
- f) Energy is emitted or absorbed in fixed amounts or quanta is based on _____ theory.
- g) The atomic mass of oxygen is _____.
- h) The general formula of accomodation of electron is _____.
- i) _____ is defined as the shortest distance between the initial and final points of a body.
- j) Equilibrium is not established for _____ and reaction.

III. Very Short answer question :-

(2x5=10)

- The symbol of an element is X. It consists of 12 protons and 12 neutron. Find out-
(i) The number of electrons (ii) Mass number
- Deduce the dimension of kinetic energy.
- A bullet of 10g leaves a 20kg gun with a velocity 100m/s. Find the velocity of recoil of the gun.
- Give two examples of Newton's 3rd laws of motion.
- What is inertia?

IV Short Answer type Question (any five)

(3X5=15)

1. State Rutherford's alpha particle-scattering experiment and write the conclusion drawn from the experiment.
2. Calculate atomic number, mass number, and draw the atomic structure of chlorine (Cl) atom.
3. Deduce Newton's first law of motion from the second law ?
4. State Reason - why does a passenger in a bus at rest lean back when the bus starts suddenly?
5. A force acting on a body of mass 10 kg changes velocity of the body from 5 m/s to 10 m/s in 5 sec. Find the value of the force in dyne and newton.
6. Define velocity. What is its S.I. unit.
7. State one difference between distance and displacement.

V. Long Answer Type Questions. (Any six)

(5x6=30)

1. Nothing moves unless it is moved- what does it indicate?
2. Why an athlete cannot stop instantaneously when he reaches the end after a race ?
3. What are isotopes? State two examples.
4. Calculate the number of moles for (i) 52g of He (ii) 92g of Na atoms.
5. State the defects of Rutherford's atomic model.
6. Express in terms of force F , length L , time T as fundamental quantities :
(i) density (ii) momentum
7. Distinguish between uniform and non uniform motions.
8. What are isobars ? state three examples.



Class-IX

Physical Science MODEL ANSWER

Section-A

- 1.b. derived unit
- 2.d. distance
- 3..b. 10^{-13} m
- 4.b. 6.022×10^{23}
- 5.b. Mg
- 6.a.isotope
- 7.b.a.m.u.
- 8.d.none of these
- 9.b.chadwick
- 10.24

Section-B

II.>

- a.derived
- b. Derived /scalar
- c.m/sec
- d. Oscillatory motion/*Periodic motion/Vibratory motion/SHM.*
- e. Subatomic particles/*Nucleons..*
- f. Bohr 's theory./quantum theory
- g. $16u$ or 16 a.m.u.
- h. $2n^2$

I. Displacement

j.action

III.>

1.number of electron= 12

Number of protons = 12

Mass number = (at .number + number of neutron)
= $12+12=24$

2. Kinetic energy = $\frac{1}{2} \text{ mass} \times (\text{velocity})^2$

= $2 \times \frac{1}{2} \times \text{mass} \times \text{velocity} \times \text{velocity}$

= $[M] [L]^2 [T]^{-2} = [ML^2 T^{-2}]$

3. $Mv = -mv$

$$= -0.1 \times 100 = 20 \times V$$

$$V = -0.1 / 20 \times 100$$

$$= -0.5 \text{ m/s}$$

Direction is opposite to the bullet.

4. Examples - 1. Burning of fuels in rocket

2. When birds fly in air, they offer downward force with their wings, this is action. The air layers exert an equal and opposite force as reaction on them so they float on air. Or Any other examples..

5. It is the inherent property of a material body by virtue of which it continues in its state of rest or motion until and unless no external force compels it to move or brings in rest.

IV.

1. Rutherford allowed a beam of high speed alpha rays emanated from a suitable radioactive source to pass through a thin gold foil, about 0.0004 mm in thickness.

Rutherford observed that-

1. most of the alpha rays continued moving in their straight paths.

2. a few were scattered through large angles.

3. one out of every 12000 particles appeared to have rebounded.

Conclusion-

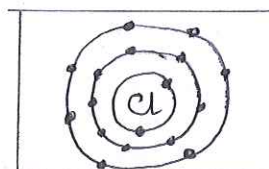
I. Most space inside the atom is empty.

II. Very few particles were deflected from their path, indicating that positive charge of atoms occupies very little space.

III. A very small fraction were deflected by 180°. It indicates that all positive charges and mass is concentrated in a very small volume within the atom.

2. chlorine: $A=35, Z=17$. $\left(\begin{smallmatrix} 35 \\ 17 \end{smallmatrix} \text{Cl} \right)$

In diagram - K shell -2, L shell -8, M shell -7.



3. From the relation $\text{force} = \text{mass} \times \text{acceleration}$, if the applied force be zero, acceleration is zero since mass cannot be zero. Now acceleration is zero means either the body is at rest or it is in uniform motion; thus in absence of external force, a body is either at rest or uniform motion. This is Newton's first law of motion.

4. When the bus starts suddenly, the lower part of the passenger is in contact of the bus, due to inertia of motion attains the motion whereas the upper part tries to remain in rest, due to inertia of rest.

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5. acceleration = $1000 - 500 / 5 = 100 \text{ cm/s}^2$

Applied force = $10000 \times 100 = 10^6 \text{ dyn} = 10 \text{ N}$.

6. Velocity is the distance covered by the body in unit time in a specified direction. It is a vector quantity. S.I. unit is m/sec.

7. displacement: shortest possible distance between the starting and ending positions of an object. Or.. distance measured in the direction from its initial to final position along a straight line. It is a vector quantity as is directional. its vector quantity. Any example...

Distance: It is the actual length of the path covered by the body irrespective of the direction. its a scalar. Any example. .

V. >

1. A body remains at rest as long as it is not disturbed by any external applied force. For disturbing it from its state of rest, it can be displaced only by application of a force in the form of pulling or pushing through. Explanation of law of inertia.

2. due to inertia of motion athlete 's body tries to remain in motion
So he continues to move for sometime.

3. Atoms of the elements having the same atomic number, same chemical properties but different mass number .

Examples-

1. hydrogen. ${}_1\text{H}^1, {}_1\text{H}^2, {}_1\text{H}^3$

2. chlorine. ${}_{17}\text{Cl}^{35}, {}_{17}\text{Cl}^{37}$

4. no. of moles = given mass / molar mass
= m/M

$$= 52 / 4 = 13$$

ii) no. of moles = given mass / molar mass .

$$= 92 / 23$$

$$= 4$$

5. a) This model is contradiction to principle of classical electrodynamics. atom should then collapse. However atom is found to be quite stable.

b) according to Rutherford electron revolving around the nucleus should lose energy continuously. Hence spectrum of atoms should be a continuous spectrum whereas the observed atomic spectrum is a line spectrum.

6.

Mass = [M]

i) Density = mass / volume = $[ML^{-3}]$

ii) Momentum = mass \times velocity = mass \times distance / time
= $[MLT^{-1}]$

7. uniform motion -

When body covers equal distance in equal interval of time .This occurs in a given direction .example suppose a car moving on a straight road with no traffic and covers 20 km every 30 minutes.

Non uniform motion- when an object covers unequal distances in equal intervals of time .example a car moving on a straight road with full traffic and hence covers different distances every 30 minutes.Any such example.

...

8.The atoms of different elements having same mass number but different atomic numbers. Examples-

