Answer key is submitted by Rumeli Dasgupta Priyali Halder 24.4.19 24.4.19

ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

1st Term Test – 2019

Sub: Physical Science **Class:** 9 **F.M:** 75

Duration: 2hr 30minutes **Date:**13/04/19

ANSWER KEY

Group-A

A. **Choose the correct answer:** 1×13=13

1. Nucleons are

a. Only protons b. Only neutrons c. **Protons and neutrons** d. protons, electrons and neutrons

2. The prefix mega stands for

a. 10^9 b. 10^8 c. 10^7 **d. 10^6**

3. Rutherford's α-particle scattering experiment led to the discovery of

a. electrons b. protons c. neutrons d. **atomic nucleus**

4. 0.012 kg of C-12 isotope contains how many C-12 atoms-

a. 12 b. **6.022×10^{23}** c. 1.66×10^{-24} d. 12g atoms

5. Element "A" has electronic configuration 2,8,3 and element "B" has electronic configuration 2,7. What is the formula of compound formed between A and B is-

a. **AB_3** b. A_2B c. AB d. AB_2

6. The slope of distance – time graph is –

a. Velocity b. acceleration c. displacement d. speed

7. Avogadro's number is used in__

a. Chemistry only b. Physics only c. Biology only d. **Chemistry ,physics and biology**

8. Calculate the mass of 1mili mole of NH_3

a. 0.17g b. **0.017g** c. 17g d. 0.0017g

9. Volume of CO_2 produced at STP from 2mole of calcium carbonate is-

a. 22.4L b. 11.2L c. 5.6L d. 11L

10. A body acted upon by a force must have –

a. velocity b. displacement c. **acceleration** d. none of these

11. Select the fundamental unit –

a.Litre b. newton c.**Ampere** d. coulomb

13. Which of the following has the largest inertia ?

a. A pin b. **Human body** c. An orange d. a brick

GROUP-B

B. **Fill in the blanks:** 1×10=10

1. The dimension of density is____[$M L^{-3}$]_____.
2. An alkali reacts with **acid** to give **salt** and water.
3. **Turmeric powder** is used as a household indicator.
4. Molecular mass of HNO_3 is **$63.01 gmol^{-1}$.**
5. **$^3H_1$ and $^4He_2$** is an example of isotone.
6. The valency of the element having electronic configuration 2,8,8,1 is **1**.
7. 1 newton =__10^5_____dyne.
8. Force =__Mass____×__Acceleration_____

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C. **Very short answer question** : 1×6=6

1. Define the term displacement.

Ans. When an object changes its position as time passes on , the distance measured in the direction from its initial to final position along a straight line is known as its displacement.

2. Calculate the mass of 22.4 litre Ne at S.T.P

Ans. Mass of Ne = no of mole × molar mass=(22.4/22.4)×20.8 = 20.8 g

3. Mention one difference between speed and velocity.

Ans. Speed of a body is the distance covered by the body in unit time whereas velocity is the distance covered by the body in unit time in a specified direction.

4. What one example of isobars?

Ans. $^{40}K_{19}$ and $^{40}Ar_{18}$

5. Find the dimensional equation of power.

Ans. Power = Work ÷ Time = $[M L^2 T^{-2}] \div [T] = [M L^2 T^{-3}]$

6. State the dimension of pressure.

Ans- $[M L^{-1} T^{-2}]$

GROUP-C

D. **Short answer type question** :

1. Do all physical quantities have units.

Ans. No, refractive index ; relative densities are some e.g of physical quantities which do not have units.

2. State the law of conservation of linear momentum.

Ans. Law of conservation of linear momentum states that in absence of any external force ,total momentum of a system of interacting bodies is conserved.Thisis accordance to Newton's third law of motion.

3. Can atomic weights be fractional? Give reasons.

Ans. Yes. As most of the elements occur as a mixture of isotopes of different masses, fractional atomic masses arise.

4. Write the electronic configuration of sulphur.

Ans. Electronic configuration =2, 8, 6

5. Do all physical quantities have dimension.

Ans. No ,angle is a dimensionless quantity .

6. Distinguish between isotope, isobar and isotone.

Ans.

Isotope	Isobar	Isotone
Same atomic number	Same mass number	Same neutron number
Chemical properties are same	Different chemical properties	Different chemical properties
Eg. $^1H_1, ^2H_1, ^3H_1$	$^{40}K_{19}$ and $^{40}Ar_{18}$	$^3H_1$ and $^4He_2$

7. What are the isotopes of hydrogen? Give the symbolic representation.

Ans. protium $^1H_1$, deuterium $^2H_1$ and tritium $^3H_1$

GROUP-D

Long answer type question: (Any ten)

1. Calculate the mass of the following: a) 0.5 mole of CO_2 b) 1milimole of HCL c) 3.011×10^{23} number of $^{16}O_8$ atoms.

   Ans. a) mass= molar mass× number of moles=44×0.5=22g

   b) 1 mili mole= 10^{-3}mole. Mass= 36.5×10^{-3}= 0.0365 g

   c) mass= number of moles × atomic mass = $(3.011\times10^{23})/(6.022\times10^{23})\times16$ = 8g

2. Calculate the number of particles in each of the following:

   a) 35.5 of Na atoms b) 11g of CO_2 c) 0.2 mol of ^{12}C atoms.

   Ans. a) The number of atoms = (given mass/molar mass)× Avogadro's number

   $= (35.5/23)\times6.022\times10^{23}$

$= 9.2948\times10^{23}$

b) $(11/44))\times6.022\times10^{23} = 1.50\times10^{23}$

c) no. of C-12 atoms = no of moles of particle × Avogadro's number = $0.2\times 6.022\times10^{23}$
$= 1.2044\times10^{23}$

3. A gun of mass 400g fires a bullet of mass 8g with a speed of 100 m/ sec .Find i) momentum of the bullet ,ii) Initial momentum of the gun and bullet as a system. Iii) recoil of the gun

Ans. Given , mass of the gun ,$m_1 = 400g = 0.4$ kg

Mass of the bullet , $m_2 = 8g = 0.08$ kg

Initial velocity of the system ,$u = 0$

Final velocity of bullet ,$v = 100$ m/s

i) momentum of the bullet = $0.08 \times 100 = 8$ $kgms^{-1}$

ii) initial momentum of the gun and bullet = $(m_1 + m_2)u = 0$

iii) momentum of the gun after firing = 0.4 x recoil velocity of the gun(V)

According to law of conservation of linear momentum,

Momentum of (gun + bullet)after firing = initial momentum of (gun + bullet)

$0.4V + 8 = 0$

$V = -20$ ms^{-1}

4. Describe an experiment how you can measure indirectly the thickness of a sheet of paper with the help of a linear scale.

Ans.Aim : To measure the thickness of a sheet of paper with linear scale.

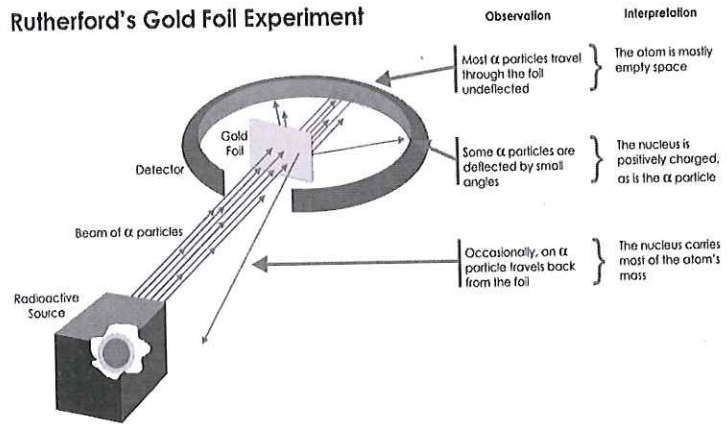
Apparatus: a thick book, a linear scale.

Procedure : we take a thick book having a large number of pages ,each pages being of thin paper sheet. we take n_1 pages of this book whose thickness can be correctly measured with linear scale.Let this thickness be x_1 cm.So, thickness of a sheet is = $x_1 \div n_1$ cm.In this way a number of readings are taken with n_2 ,n_3 ,n_4 ,……number of pages and thickness x_1 ,x_2 ,…..

Conclusion : Average of $x_1/n_1, x_2/n_2$,…..,gives the thickness of a sheet of the thin paper of the book indirectly.

5. Describe briefly the inferences drawing from α-particle scattering experiment (with diagram) of Rutherford for the determination of structure of atom.

Ans.



Experiment:

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

Observation:

1. Most of the α-particles continued moving in their original straight paths.
2. A few were scattered through large angles.
3. One out of every 12000particles appeared to have rebounded.

Conclusion:

1. Most of the space inside the atom is empty as most of the α particles passed through the gold foil without getting deflected.
2. Very few particles were deflected from their path indicating that positive charge occupies very little space.

6. a) What are the fundamental particles of atom? b) Among these which one is lightest and which one is heaviest? c) Discuss the structure of any two isotopes of oxygen.

Ans. a) Electron, proton and neutron. b) Lightest is electron and heaviest is neutron.
c) $^{16}O_8$, $^{17}O_8$, $^{18}O_8$.

7. How can you measure density of a piece of stone with a measuring cylinder and spring balance ?

Ans. Aim : To measure the density of a piece of stone using spring balance and measuring cylinder.

Apparatus : measuring cylinder,spring balance, stone.

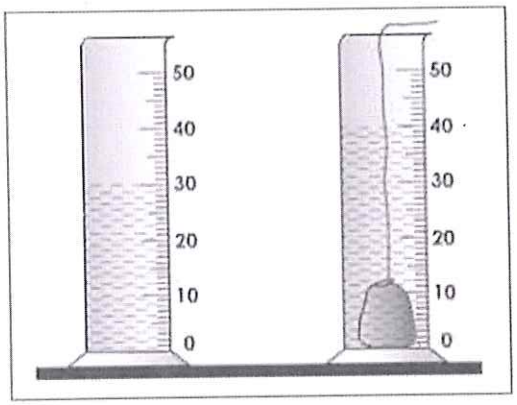
Procedure : We fill some water in a dry measuring cylinder and mark the level as V_1

Now the stone is tied with a piece of waxed thread and is dipped slowly inside the water so that no water splashes outside of measuring cylinder.Let the new volume of water be V_2

The mass of the stone is taken as m using spring balance.

Density of stone = mass of stone ÷ $Volume\ of\ the\ stone$

$= m_1 / V_2 - V_1$



8.State the reason :

a) A passenger leans forward to the ground from a running bus.

Ans. This is due to inertia of motion because on touching the ground the lower part of the body of the passenger comes to rest while the upper part of the body still tends to continue in its state of motion with the speed of the bus. Thus leans forward.

b) Birds cannot fly in vaccum.

Ans. While flying , a bird applies a force on the air by its wings.The air also exerts an equal and opposite reaction force to this action force of the wings which helps and bird to fly floating on the air.For this reason birds cannot fly in vacuum

9 A body of mass 147g at rest is subjected to a force of 15 **g unit**.What is the acceleration of the body ? What will be the velocity of the body after 2 sec .

10 .Write 5 differences between distance and displacement ?

Ans.

Distance	Displacement
1. the total path covered by a body is called distance. 2. The distance is addition of all small paths. 3. Straight line path is not necessary . 4. It is scalar quantity. 5. It cannot be zero nor can be negative.	The shortest distance covered by a body is displacement. 2. The displacement is measured from its initial to final position . 3. straight line path is considered as shortest path. 4.It is vector quantity. 5. It can be zero , if initial and final point are same,it can be positive or negative.

11.i) The graph is a straight line having upward slope, it represents uniform acceleration.

ii) It is a straight line parallel to time axis ,it represents uniform speed.

iii) acceleration = AD/OD = 10 m/s ÷ 5s =2m /s^2

Distance = area of trapezium OABC = ½ x (AB + OC) x BE = ½ x {(25 – 5) + 30 } x 10 m

= 250m.,