Answers – Activity Sheet – July 2023

Q.1. (A) Choose the correct alternative and write the correct option. **[5]**

i. _____ has the highest refractive index. [1]

a. Air b. Water c. Glass d. Diamond

ii. The left hand side of a chemical reaction represents _____. [1]

a. products b. reactants c. catalysts d. indicators

iii. In _____block of the modern periodic table non-metals are found. [1]

a. *s*-block b. *d*-block c. *p*-block d. *f*-block

iv. The chemical reaction in which two or more products are formed from a single reactant is called _____ reaction. [1]

a. decomposition b. combination

c. displacement d. double displacement

v. If the refractive index of glass with respect to air is $\frac{3}{2}$, the refractive index of air with respect to glass is [1]

a. $\frac{1}{2}$ b. 3 c. $\frac{1}{3}$ d. $\frac{2}{3}$

(B) Attempt the following questions: [5]

i. State whether the given statement is true or false:

Rancidity is oxidation process.

Ans. True. [1]

ii. Find the odd one out:

Camera, Telescope, Peephole in door, Microscope

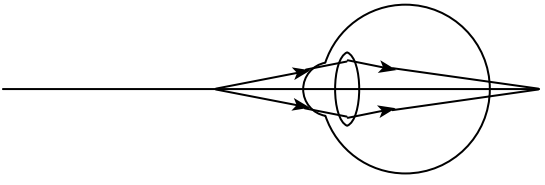
Ans. Peephole in door [1]

iii. Find the co-relation:

Resistance : Ohm : : Potential difference : .....

Ans. Volt [1]

iv. Write the defect of eye from the given figure:



Ans. Farsightedness or Hypermetropia [1]

v. Give the unit of intensity of magnetic field.

Ans. Oersted [1]

Q.2. (A) Give scientific reasons. (Any two) [4]

i. Tungsten metal is used to make solenoid type coil in an electric bulb.

Ans.

(a) Tungsten metal has high resistivity and high melting point.[1/2]

(b) When the current flows through the circuit, tungsten wire gets heated to nearly 3,400 °C. [1/2]

(c) At this high temperature, tungsten does not melt, but begins to emit light. [1/2]

(d) As tungsten is ductile, it can be made into thin filaments. [1/2]

Therefore, tungsten metal is used to make a solenoid-type coil in an electric bulb.

ii. Simple microscope is used for watch repairs.

Ans.

(a) A simple microscope is made of a convex lens with a small focal length. It produces a virtual, erect, and bigger image of an object. [1]

(b) It enables small parts of a watch to be magnified 20 times and thus seen clearly. Therefore, watch repairers use simple microscope. [1]

iii. Metallic character goes on decreasing while going from left to right in a period.

Ans.

(a) Metals have a tendency to lose valence electrons to form cations (positive ions). [1]

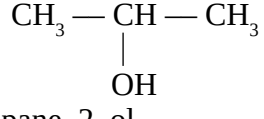
(b) As we go from left to right, the number of valence electrons in the outermost shell increases, but the number of shells remain the same.

The atomic radius decreases and the positive charge on the nucleus increases. As a result of this, the tendency of atom to lose valence electrons decreases within a period from left to right.

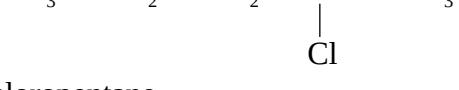
Hence, metallic character decreases from left to right in a period. [1]

(B) Answer any three of the following questions. [6]

i. Write the IUPAC names of the following structural formulae:

a. 

Ans. Propane–2–ol [1]

b. 

Ans. 2-chloropentane [1]

ii. An iron ball of mass 5 kg is released from a height of 125 m and falls freely to the ground. Assuming that the value of g is 10 m/s^2, calculate time taken by the ball to reach the ground.

Solution:

Given: An iron ball of mass m = 5 kg,

Distance travelled by the ball s =125 m,

Initial velocity of the ball = u = 0 and

Acceleration $a = g$ = 10 m/s^2.

Newton's second equation of motion gives

$$s = ut + \frac{1}{2}at^2 \qquad [1/2]$$

$$\therefore \quad 125 = 0t + \frac{1}{2} \times 10 \times t^2 = 5t^2 \qquad [1/2]$$

$$t^2 = \frac{125}{5} = 25, \; t = 5\text{s} \qquad [1]$$

Ans. The ball takes **5 seconds** to reach the ground.

iii. What is meant by artificial satellite? Name the first satellite launched by Russia.

Ans. A manmade object revolving around Earth or any other planet in a fixed orbit is called an artificial satellite. [1]

Name of the first satellite launched by Russia is Sputnik. [1]

iv. Draw the image formed by convex lens, if object is placed at $2F_1$.

Ans. [2]

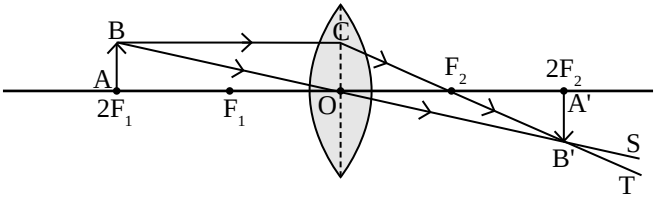


Image formation when the object is at $2F_1$

v. Why does the apparent position of stars keep changing a bit?

Ans.

(a) The density and the temperature of air in different layers of the atmosphere change with height from the surface of Earth.

(b) The refractive index of air increases continuously with decrease in height.

(c) When the light from a star enters Earth's atmosphere, it travels from rarer to denser medium and so it repeatedly bends towards the normal.

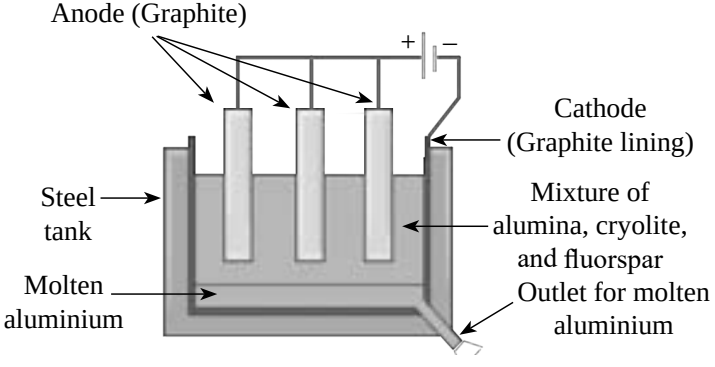
(d) This repeated bending of starlight towards the normal makes the star appear to be higher in the sky as compared to its actual position. Thus, the apparent position of the stars keeps changing a bit. [1/2 mark for each point.]

Q.3. Answer any five of the following questions: [15]

i. Identify the process given below and accordingly draw a neat labelled diagram:

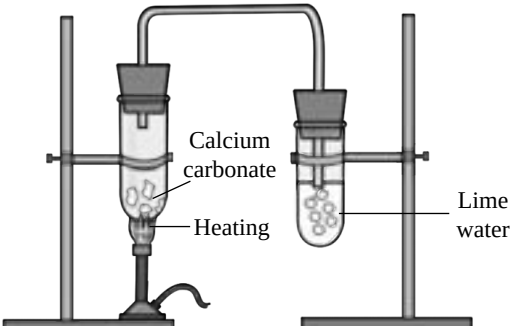
A molten mixture of alumina (melting point > 2000°C) is done in a steel tank. The tank has a graphite lining on the inner side. The lining does the work of cathode. A set of graphite rods dipped in the molten electrolyte works as anode. Cryolite (Na_3AlF_6) and fluorspar (CaF_2) are added in the mixture to lower its melting point upto 1000°C.

Ans. Electrolytic reduction of alumina



[Diagram: 2 marks, Labelling:1mark]

ii. With reference to the given diagram answer the following questions:



(a) Give type of chemical reaction.

Ans. Heating of calcium carbonate is a decomposition reaction and an endothermic reaction. [1]

(b) Give the names of reactants and products.

Ans. Reactant: Calcium carbonate ($CaCO_3$)
Products: Calcium oxide (CaO) and carbon dioxide (CO_2) [1]

(c) Write down the balanced chemical equation.

Ans. $CaCO_3(s) \xrightarrow{\Delta} CaO(s) + CO_2(g)\uparrow$ [1]

iii. What is Electrical Power? Derive the unit of electic power from the given equations:

$P = V \times \square$

$P = \square \times$ ampere

$= 1 \text{ volt} \times 1 \square = \frac{1J}{1C} \times \frac{1C}{1S}$

$\therefore \quad P = \frac{1J}{\square} = W \text{ (Watt)}$

Ans. Electrical power is the energy required per unit of time.

$$\text{Electrical power} = \frac{\text{Energy}}{\text{Time required}} \quad [1]$$

$P = V \times \boxed{I}$ [1/2]

$= \boxed{\text{volt}} \times$ ampere [1/2]

$$P = 1\text{volt} \times 1 \boxed{\text{ampere}}$$

$$= \frac{1J}{1C} \times \frac{1C}{1S} \qquad [1/2]$$

$$P = \frac{1J}{\boxed{1s}} = W \text{ (watt)} \qquad [1/2]$$

iv. Explain the term anodization with example. Give *one* use of it.

Ans.

(a) In the process of anodization, metals like copper and aluminium are coated with a thin and strong layer of their own oxides by means of electrolysis. [1]

(b) For example, when aluminium is anodized, a thin layer of aluminium oxide is formed. [1]

(c) It is useful for prevention of the corrosion of metals. [1]

v. State Kepler's *three* laws of motion.

Ans.

(a) Kepler's first law: The orbit of a planet is an ellipse with the Sun at one of the foci. [1]

(b) Kepler's second law: The line joining the planet and the Sun sweeps equal areas in equal intervals of time. [1]

(c) Kepler's third law: The square of period of revolution of a planet around the Sun is directly proportional to the cube of the mean distance of the planet from the Sun. [1]

vi. The electronic configuration of an element X is 2, 8, 8, 2.

(a) What is the atomic number of the element X?

Ans. Atomic number of element X is 20. [1]

(b) To which group does this element belong?

Ans. This element belongs to the second group. [1]

(c) In which period does this element lie?

Ans. This element lies in 4^{th} period. [1]

vii. What is the contribution of India in space technology?

Ans.

(a) India has made remarkable progress in the science and technology of launch vehicles. PSLV and GSLV are two important launchers. [1]

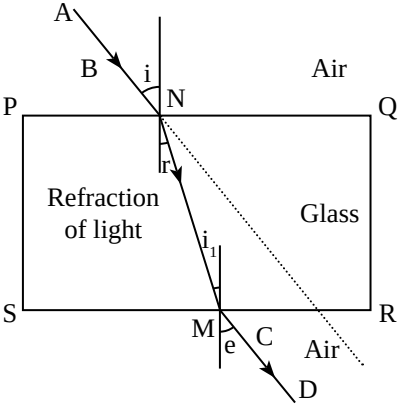
(b) INSAT and GSAT satellite series is actively working in the field of telecommunication, television broadcasting, and meteorological services. EDUSAT satellite series is used specially in the field of education. [1/2]

(c) IRS satellite series has been working for monitoring and management of natural resources and disaster management. The IRNSS satellite series has been established to exactly locate the position of any place on Earth's surface in terms of its precise latitude and longitude. [1/2]

(d) In 2008, Indian Space Research Organization (ISRO) successfully launched Chandrayaan–1 and placed it into an orbit around the Moon. It sent useful information to Earth for about a year. The most important discovery made during the mission was the presence of water on the Moon's surface. India was the first country to discover this. [1/2]

(e) The spacecraft '*Mangalyaan*' made by ISRO was placed into an orbit around Mars in 2014. It obtained very useful information about the surface of Mars and the atmosphere around it. [1/2]

viii. Observe the given diagram and answer the following questions:



(a) What is refraction of light?

Ans. Light changes its direction when going from one transparent medium to another transparent medium. This is called refraction of light. [1]

(b) Name the emergent ray.

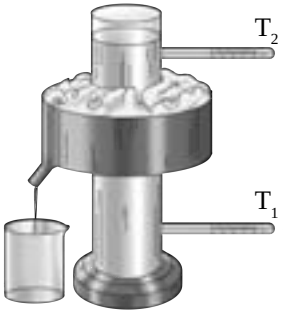
Ans. Ray CD – Emergent ray [1]

(c) Which two angles are equal?

Ans. Angle of incidence = Angle of reflection, $\angle i = \angle e$, $\angle r = \angle i_1$ [1]

Q.4. Attempt any one of the following questions: [5]

i. Observe the given diagram and answer the following questions:



(a) What is the name of the given apparatus?

Ans. Name of this apparatus is Hope's apparatus. [1]

(b) Which phenomenon is studied with the help of this apparatus?

Ans. The phenomenon of anomalous behaviour of water is studied with the help of this apparatus. [1]

(c) What are the final temperatures in thermometers T_1 and T_2?

Ans. Final temperatures in thermometers T_1 and T_2 are: T_1 = 4 °C, T_2 = 0 °C. [1]

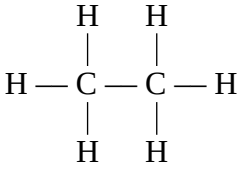
(d) At what temperature the density of water is maximum?

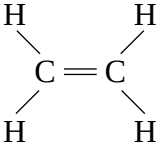
Ans. The density of water is maximum at 4°C. [1]

(e) Give one example of the above phenomenon in nature.

Ans. In cold regions, only the top layer of water in ponds, lakes, etc., freezes and forms a layer of ice but the water underneath it remains in liquid state. Thus, aquatic plants and animals can survive even when the atmospheric temperature goes below 0 °C. This is due to anomalous behavior of water. [1]

ii. Observe and write the answers to the questions given below:

I. 

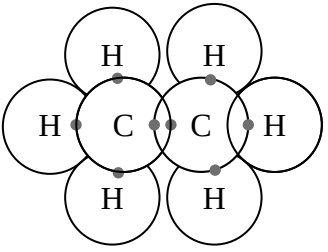
II. 

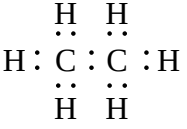
(a) Write the names of compound I and II.

Ans. Name of compound I is Ethane [1]
and compound II is Ethene. [1]

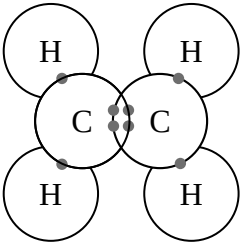
(b) Draw electron-dot structure for I and II.

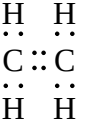
Ans. (i) Electron –dot structure of compound I – Ethane [1]





(ii) Electron-dot structure of compound II – Ethene [1]





(c) Which one of the above structures is saturated compound and unsaturated compound?

Ans. Ethane is saturated compound. [1/2]
Ethene is unsaturated compound. [1/2]

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