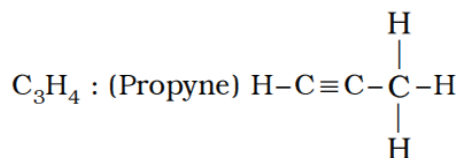


## Sure shots (1 Mark) Solutions

1. resistor
2. Rod like cells – (b) Intensity of light
3. Temperature  
[All others are transfers of thermal energy, whereas temperature is the degree of heat] → *for reference only.*
4. True
5. Zinc
6. False. (If the height of the orbit of a satellite increases, its velocity decreases)
7. Ohm ( $\Omega$ )
8. The wavelength of the violet light – (c) close to 400 nm.
9.  $C_2H_4$  (others are saturated hydrocarbons.)
10. According to Faraday's law of induction, bulb A will fuse.
11. Weather satellite
12. Reduction – (b) Combination with hydrogen
13. Neutralization [Reflection, refraction and dispersion are properties of light while neutralization is a reaction of an acid and a base that results in an ionic compound.]
14. False [ $v > v_e$ ]
15. Centripetal force.
16. Gravitational constant – (c) Same in the entire universe

17.



18.

True

19.

The natural process shown in the figure is formation of rainbow.

20.

GSLV

21.

Nichrome

22.

Polysaccharide (others are manmade polymers.)

23.

Earth observation satellite (a) Satellite : IRS

(b) Launcher : PSLV

24.

True

25.

Power of a lens : diopter

### Sure shots (2 Marks) Solutions

26.

(1) In cold countries, in winter, a layer of ice is formed on the surface of lakes when the atmospheric temperature falls below  $0^\circ\text{C}$ . However, below this layer, there is water at  $4^\circ\text{C}$ .

(2) Ice, being a bad conductor of heat, does not allow transfer of heat from this water to the atmosphere. Hence, aquatic animals and plants can survive in this water.

27.

(1) In the atoms of the inert gas elements (zero group elements), all the electronic shells, including the outermost shell, are completely filled.

(2) The electronic configuration is stable, and these elements do not lose or accept electrons. These elements do not take part in chemical reactions. These elements are gases. Hence, they are called noble gases.

28.

(1) Copper and aluminium are good conductors of electricity.

(2) Copper and aluminium have very low resistivity. Hence, when an electric current flows through a wire of copper or aluminium, heat produced is comparatively low. Therefore, for electric power transmission, copper or aluminium wire is used.

29.

(1) As a star is far away from the earth, it appears as a point source of light.

Air is always in motion.

(2) The density and temperature of air change continuously resulting in the change in the refractive index of air in a given region of space. Hence, there is a continuous change in the apparent position and brightness of a star. Hence, the star appears to twinkle.

30.

(1) In a period, while going from left to right, the atomic radius goes on decreasing and the atomic number increases one by one, that means positive charge on the nucleus increases by one unit at a time.

(2) However, the additional electron is added to the same outermost shell. Due to the increased nuclear charge, the electrons are pulled towards the nucleus to a greater extent, as a result the size of atom decreases, i.e. atomic radius decreases.

31.

(1) The weight of a body of mass  $m$  on the surface of a planet of mass  $M$  and radius  $R$  is  $W = \frac{GmM}{R^2}$  (in the usual notation).

(2) For a given body, its mass is constant.  $G$  is the universal constant of gravitation. Different planets have different masses and radii such that the ratio ( $M/R^2$ ) is not the same. Hence, the weight of a body is different on different planets.

32.

(1) In cold countries, in winter, the temperature of the atmosphere falls below  $0^\circ\text{C}$ . When the temperature of water falls below  $4^\circ\text{C}$ , it expands. Hence, the water in pipes expands. Even if ice is formed, there is an increase in the volume.

(2) As there is no room for expansion, water (or ice) exerts a large pressure on the pipes. Hence, the pipelines carrying water burst.

33.

(1) The valency of an element is determined by the number of valence electron in the outermost shell of an atom of an element.

(2) All the elements in a group have the same number of valence electrons. Therefore, elements in the same group should have the same valency. For example, the elements of group I contain only one valence electron; the valency of elements of group I is one. Similarly for group II, the valency is two.

---

34.

(1) A fuse is used to protect a circuit and the appliances connected in the circuit by stopping the flow of an excessive electric current. For this, a fuse is connected in series in the circuit.

(2) When the current in the circuit passes through the fuse, its temperature increases. When the current exceeds the specified value, the fuse must melt to break the circuit. For this, the material used for a fuse has low melting point.

35.

(1) The retina in the eye is made of many light sensitive cells. The rod-shaped cells respond to the intensity of light while the cone-shaped cells respond to various colours.

(2) The cone-shaped cells do not respond to faint light. They function only in bright light. Hence, one can sense colours only in bright light.

36.

(1) The working of heating devices such as a toaster and an electric iron is based on the heating effect of electric current, i.e. conversion of electric energy into heat by passage of electric current through a metallic conductor.

(2) An alloy, such as Nichrome, has high resistivity and it can be heated to a high temperature without oxidation, in contrast to pure metals. Therefore, the coils in heating devices such as a toaster and an electric iron are made of an alloy, such as Nichrome, rather than a pure metal.

37.

Copper oxidises to form black coloured layer of copper oxide. When copper oxide combines with carbon dioxide from air, copper loses its lustre due to formation of greenish layer of copper carbonate on its surface. Thus, copper articles exposed to air for a long time get corroded.

38.

(1) The acceleration due to gravity on the moon is about  $\frac{1}{6}$  of that on the earth.

(2) In the usual notation, we have  $h = \frac{u^2}{2g}$ . This shows that with a specific initial velocity, we can jump higher on the moon than on the earth.



39.

- (1) When a pencil is partly immersed in water and held in a slanting position, the rays of light coming from the immersed part of the pencil emerge from water (a denser medium) and enter air (a rarer medium). During this propagation, they bend away from the normal on refraction.
- (2) As a result, the immersed part of the pencil does not appear straight with respect to the part outside the water, but appears to be raised. Hence, a pencil dipped obliquely in water appears bent at the surface of the water.

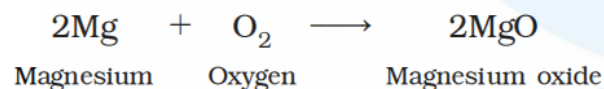
40.

- (1) Silver is a soft metal and wears off on constant usage particularly due to abrasion. Silver amalgam is an alloy of silver and mercury.
- (2) It is a hard substance. It is nontoxic. Besides these properties it is a lustrous shining substance. It melts at a comparatively low temperature and can therefore conveniently fill in the cavities. Hence, silver amalgam is used for filling dental cavities.

(3 marks)

41.

When magnesium burns in air, it combines with oxygen, emitting intense light and heat to form magnesium oxide.

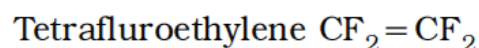


42.

Mass	Weight
1. The mass of a body is the amount of matter present in it.	1. The weight of a body is the force with which the earth attracts it.
2. It has magnitude, but not direction.	2. It has both magnitude and direction.
3. It does not change from place to place.	3. It changes from place to place.
4. It can never be zero	4. It is zero at the centre of the earth.
5. Its SI unit is kilogram.	5. Its SI unit is newton.

43.

The name and structure of monomer :



Teflon is used to make nonstick cookware.

44.

- (1) When the incident ray is parallel to the principal axis, the refracted ray passes through the principal focus.
  - (2) When the incident ray passes through the principal focus, the refracted ray is parallel to the principal axis.
  - (3) When the incident ray passes through the optical centre of the lens, it passes without changing its direction.
- (Any two rules)**

45.

A geostationary satellite revolves in the equatorial plane of the earth, and thus, not around the polar regions.

Hence, geostationary satellites are not useful for studies of polar regions.

46.

**Given :**  $P=100\text{ W}$ ,  $I=3\text{A}$ ,  $R=?$

$$P=I^2R$$

$$\begin{aligned} \therefore \text{Resistance, } R &= \frac{P}{I^2} = \frac{100\text{ W}}{(3\text{A})^2} \\ &= \frac{100}{9} \Omega = \mathbf{11.11 \Omega} \end{aligned}$$

47.

Sometimes water enters into crevices of the rocks. When the temperature of the atmosphere falls below  $4^\circ\text{C}$ , water expands. Even when water freezes to form ice, there is increase in its volume. As there is no room for expansion, it exerts a tremendous pressure on the rocks which crack and break up into small pieces.

48.

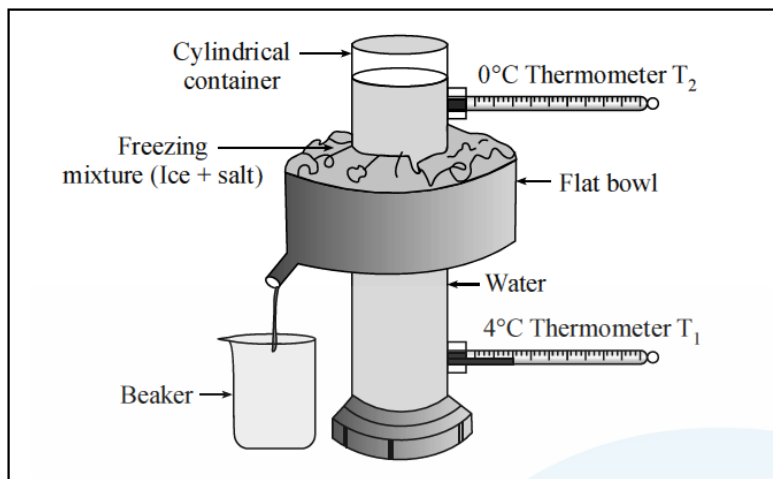
(a) Displacement reaction

(b) Combination reaction

49.

Metals	Nonmetals
1. Metals have a lustre.	1. Nonmetals have no lustre. Exception : Iodine and Diamond.
2. They are generally good conductors of heat and electricity.	2. They are bad conductors of heat and electricity. Exception : Graphite.
3. They are generally solids at room temperature. Exception: Mercury and gallium are liquids.	3. They are generally gases and solids at room temperature. Exception : Bromine is a liquid.
4. Metals form basic oxides.	4. Nonmetals form acidic or neutral oxides.

50.



51.

AC generator	DC generator
<ol style="list-style-type: none"> <li>1. In an AC generator, the rings used are not split.</li> <li>2. The direction of the current produced reverses after equal intervals of time.</li> </ol>	<ol style="list-style-type: none"> <li>1. In a DC generator, split rings are used.</li> <li>2. The current produced flows in the same direction all the time.</li> </ol>

52.

The mass of water vapour present in a unit volume of air is called absolute humidity. Generally it is expressed in  $\text{kg/m}^3$ .

53.

Given : The absolute refractive index of water ( $n$ ) = 1.36

Velocity of light in vacuum ( $v_1$ ) =  $3 \times 10^8$  m/s

Formula :  $n = \frac{v_1}{v_2}$

$$\therefore 1.36 = \frac{3 \times 10^8}{v_2}$$

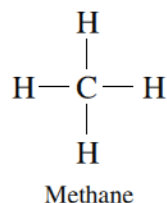
$$\therefore v_2 = \frac{3 \times 10^8}{1.36} = 2.21 \times 10^8 \text{ m/s}$$

**The velocity of light in water is  $2.21 \times 10^8$  m/s.**

54.

In hydrocarbon, the four valencies of carbon atom are satisfied only by the single bonds, such compounds are called saturated hydrocarbons.

For example : Methane molecule contains only one carbon atom. In methane, four hydrogen atoms are bonded to carbon atom by four covalent bonds.



55.

- (1) In the figure, process of Electroplating is shown.
- (2) The process in which a less reactive metal is coated on a more reactive metal by electrolysis is called electroplating.

56.

- (1) In a space nonessential objects such as the parts of launchers and satellites, revolving around the earth are called the debris in space.
- (2) The debris can be harmful to the artificial satellites. It can collide with the satellites or spacecrafts and damage them. Therefore the future of artificial satellites or spacecrafts are in danger.
- (3) Hence, it is necessary to manage the debris.

57.

Whether air is saturated with water vapour or not is determined on the basis of the extent of water vapour present in the air. If the relative humidity is 100%, air is saturated with water vapour. In that case, we can see formation of water droplets on the leaves of plants/grass.

If the relative humidity is less than 100%, air is not saturated with water vapour.

58.

A : Direction of the magnetic field.

B : Direction of the current.

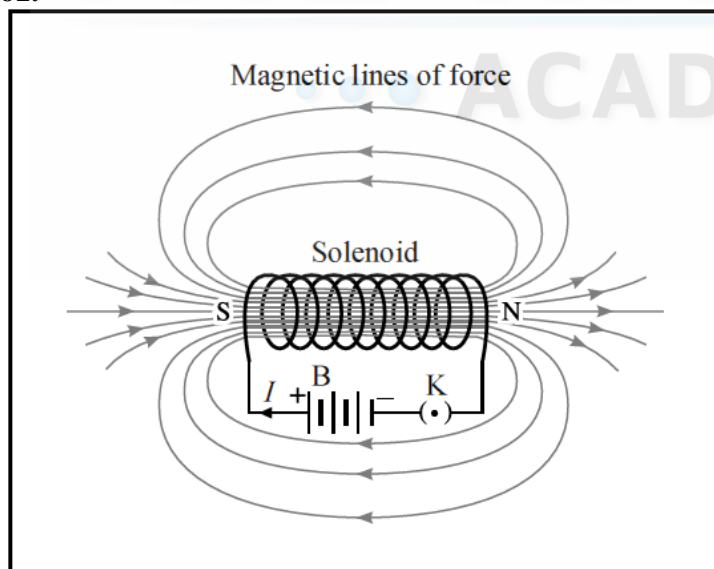
59.

- (a) Inert gas elements : (2, 8)
- (b) Third row elements : (2, 8, 1)
- (c) Second group elements : (2, 2)
- (d) Seventeen group elements : (2, 7)

60.

- (a) Reduction
- (b) Oxidation

61.





62.

**Data :**  $P_1 = 100 \text{ W}$ ,  $P_2 = 60 \text{ W}$ ,  $V = 220 \text{ V}$

$$I = ? \quad \therefore I = \frac{P}{V}$$

$$P = VI \quad \therefore I_1 = \frac{P_1}{V} \text{ and } I_2 = \frac{P_2}{V}$$

Current in the main conductor,  $I = I_1 + I_2$  (parallel connection)

$$= \frac{P_1}{V} + \frac{P_2}{V} = \frac{P_1 + P_2}{V} = \frac{100 \text{ W} + 60 \text{ W}}{220 \text{ V}} = \frac{160}{220} \text{ A} = 0.727 \text{ A} \approx \text{nearly } 0.73 \text{ A.}$$

63.

(1) If the temperature of water is raised from  $0^\circ\text{C}$  to  $10^\circ\text{C}$ , its volume goes on decreasing in the range  $0^\circ\text{C}$  to  $4^\circ\text{C}$ . It is minimum at  $4^\circ\text{C}$ . The volume of water goes on increasing in the range  $4^\circ\text{C}$  to  $10^\circ\text{C}$ .

(2) In general, when a substance is heated, its volume goes on increasing with temperature. Thus, in the range  $0^\circ\text{C}$  to  $4^\circ\text{C}$ , behaviour of water is different from other substances. It is called anomalous behaviour of water.

64.

Mendeleev's periodic table	Modern periodic table
1. In this table, the elements are arranged in the order of their increasing atomic weights.	1. In this table, the elements are arranged in the order of their increasing atomic number.
2. In this table, the position of an element is based on its properties and atomic weight.	2. In this table, the position of an element is based on its electronic configuration.
3. There are 8 groups in this table.	3. There are 18 groups in this table.
4. In this table, some elements having similar properties are found in different groups, while those having different properties are sometimes found in the same group.	4. In this table, the elements belonging to the same group show similar chemical properties.

65.

The chemical substance which brings about an oxidation reaction by making oxygen available is called oxidant or oxidizing agent.

(1) In the combustion of carbon, oxygen is an oxidant.

(2) In the oxidation of ethyl alcohol, potassium dichromate is used as oxidant.

66.

- (a) The right hand thumb rule.
- (b) Fleming's right hand rule.
- (c) Fleming's left hand rule.

67.

- (a) The principle behind the working of a satellite launch vehicle is Newton's third law of motion. It states that every action force has an equal (in magnitude) and opposite (in direction) reaction force which acts simultaneously.

- (b) Escape velocity,

$$v_{\text{esc}} = \sqrt{\frac{2GM}{R}}, \text{ where}$$

$G$  ≡ the universal gravitational constant,

$M$  ≡ mass of a planet (or star or moon) and

$R$  ≡ radius of the planet (or star or moon).

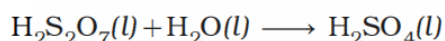
- (c) Indian Space Research Organisation.

68.

- (a) Metals which react with water : Potassium, Sodium.
- (b) Two moderately reactive metals : Magnesium, aluminium.
- (c) The most highly reactive metal : Potassium.  
The least reactive metal : Gold.

69.

**Step 1 :** Rewrite the given equation as it is



**Step 2 :** Write the number of atoms of each element in the unbalanced equation on both sides of equations.

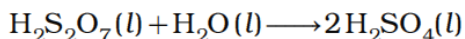
Element	Number of atoms in reactant (left side)	Number of atoms in products (right side)
H	4	2
S	2	1
O	8	4

**Step 3 :** To equalise the number of hydrogen atoms, sulphur atoms and oxygen atoms we use 2 as the coefficient or factor in the product.

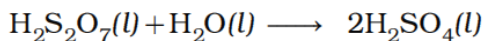
Element	Number of atoms in reactant (left side)	Number of atoms in products (right side)
H	4	$2 \times 2$
S	2	$1 \times 2$
O	8	$4 \times 2$
<b>Total</b>	14	14

Now the equation becomes  $\text{H}_2\text{S}_2\text{O}_7 + \text{H}_2\text{O} \longrightarrow 2\text{H}_2\text{SO}_4$

Now, count the atoms of each element on both sides of the equation. The number of atoms on both sides are equal. Hence, the balanced equation is



Now indicate the physical states of the reactants and products.



**70.**

**Data :** Converging lens,  $f = 10$  cm

$$u = -25 \text{ cm}, h_1 = 5 \text{ cm}, v = ?, h_2 = ?$$

$$(1) \frac{1}{f} = \frac{1}{v} - \frac{1}{u} \quad \therefore \frac{1}{v} = \frac{1}{f} + \frac{1}{u}$$

$$\therefore \frac{1}{v} = \frac{1}{10 \text{ cm}} + \frac{1}{-25 \text{ cm}} = \frac{1}{10 \text{ cm}} - \frac{1}{25 \text{ cm}} = \frac{5-2}{50 \text{ cm}} = \frac{3}{50 \text{ cm}}$$

$$\therefore \text{Image distance, } v = \frac{50}{3} \text{ cm} = 16.67 \text{ cm} = \mathbf{16.7 \text{ cm.}}$$

$$(2) \frac{h_2}{h_1} = \frac{v}{u} \quad \therefore h_2 = \frac{v}{u} h_1$$

$$\therefore h_2 = \frac{(50/3) \text{ cm}}{-25 \text{ cm}} \times 5 \text{ cm} = -\frac{50 \times 5}{25 \times 3} \text{ cm}$$

$$= -\frac{10}{3} \text{ cm} = -3.333 \text{ cm}$$

$$= -3.3 \text{ cm}$$

**The height of the image = -3.3 cm** (inverted image  $\therefore$  minus sign).

**(3) The image is real, inverted and smaller than the object.**

**71.**

(a) From the given description we understand Kepler's three laws.

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

(c) **Kepler's law of periods :** The square of the 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.

**72.**

With reference to oxygen and hydrogen there are two types of reaction:

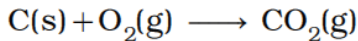
(1) Oxidation reaction.

(2) Reduction reaction.

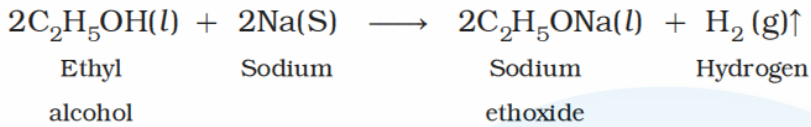
Example for oxidation reaction :

*(Any one example)*

- (1) When carbon burns in air, it forms carbon dioxide. In this reaction carbon accepts oxygen, therefore, this is an oxidation reaction.

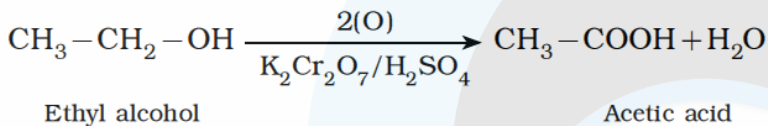


- (2) When sodium reacts with ethyl alcohol, sodium ethoxide and hydrogen gas is formed. In this reaction, hydrogen is removed from ethyl alcohol, therefore this is an oxidation reaction.



- (3) Acidified potassium dichromate

( $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$ ) oxidizes ethyl alcohol to acetic acid.

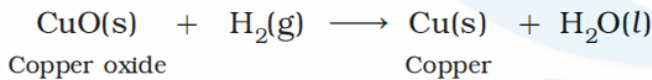


Example for reduction reaction :

*(Any one example)*

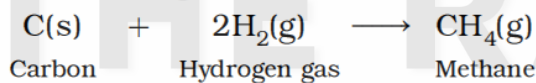
- (1) When hydrogen gas is passed over black copper oxide a reddish coloured layer of copper is formed.

In this reaction an oxygen atom removed from CuO to form copper, hence, this is reduction.



- (2) When hydrogen gas is passed over red hot coke, methane is obtained.

Here, hydrogen is added to coke (carbon). Hence, this is reduction.



73.

(a) Eka-silicon	Germanium
(b) Eka-boron	Scandium
(c) Eka-aluminium	Gallium

74.

- (a) Electric motor.  
(b) Fleming's left hand rule.  
(c) Fan, washing machine.



75.

**Data :**  $h = 500 \text{ m}$ ,  $g = 10 \text{ m/s}^2$ ,

$v = 0 \text{ m/s}$ ,  $u = ?$ ,  $t$  (for the object going up) +  $t$  (for the object coming down) = ?

As the object moves upward,

$$v^2 = u^2 + 2as$$

$$= u^2 + 2(-g)h \quad (\because a = -g)$$

Now,  $v = 0 \text{ m/s}$

$$\therefore u^2 = 2gh = 2 \times 10 \text{ m/s}^2 \times 500 \text{ m}$$

$$\therefore u^2 = (100 \times 100) \text{ m/s}^2$$

$\therefore \mathbf{u = 100 \text{ m/s (initial velocity of the body)}}$

Also,  $v = u + at = u - gt$

For  $v = 0 \text{ m/s}$ ,  $u = gt$

$$\therefore 100 \text{ m/s} = 10 \text{ m/s}^2 \times t$$

$$\therefore t \text{ (for the object going up)} = 10 \text{ s}$$

Now,  $t$  (for the object coming down) =  $t$  (for the object going up) = 10 s

$\therefore t$  (for the object going up) +  $t$  (for the object coming down)

$$= 10 \text{ s} + 10 \text{ s} = 20 \text{ s}$$

**It will take 20 s for the object to come back to the earth.**

76.

(a) The block shown by box A is the s-block. Electronic configuration of Mg : 2, 8, 2.

(b) The block of element denoted by letter B is the d-block and its period number is 4.

(c) Metalloids : Boron (B) and Silicon (Si).

77.

(a) Critical angle,  $r = 90^\circ$

(b) Total internal reflection.

As light goes from a denser to rarer medium, if the value of the angle of incidence increases, then the value of the angle of refraction also increases. But after a specific angle of incidence called the critical angle, the light gets reflected back into the denser medium.

78.

The homogeneous mixture formed by mixing a metal with other metals or nonmetals in certain proportion is called an alloy.

**Examples :**

(1) **Bronze :** Bronze is an alloy formed from 90% copper and 10% tin.

(2) **Stainless steel :** Stainless steel alloy is made from 74% iron, 18% chromium and 8% carbon.

79.

A man-made object orbiting around the earth or any other planet is called an artificial satellite.

- (a) **Weather satellites** : Weather satellites collect the information regarding weather conditions of the region. It records temperature, air pressure, wind direction, humidity, cloud cover, etc. this information is sent to the space research station on the earth, and then with this information weather forecast is made.
- (b) **Broadcasting satellites** : Broadcasting satellites are used to transmit various radio and television programmes and even live programmes from any place on the earth to any other place. As a result, one can have access to information about current incidents, events, programmes, sports and other events right from his drawing room with these satellites.

80.

- (a) *n*-Butane  
(b) Ethanamine  
(c) Ethanal

81.

- (1) Polysaccharide is a natural polymer. It occurs in starch/carbohydrates. It is formed from monomer glucose.
- (2) Protein is a natural polymer. It occurs in muscles, hair, enzymes, skin, egg. It is formed from alpha amino acids.
- (3) Rubber is a natural polymer. It occurs in latex of rubber tree. It is formed from monomer isoprene.

82.

**Data** :  $t = 1\text{ s}$ ,  $g = 10\text{ m/s}^2$ ,  $u = 0\text{ m/s}$ ,

$s = ?$ ,  $v = ?$

(1)  $s = ut + \frac{1}{2}gt^2 = \frac{1}{2}gt^2$  for  $u = 0\text{ m/s}$

$$\therefore s = \frac{1}{2} \times 10\text{ m/s}^2 \times (1\text{ s})^2 = 5\text{ m}$$

**$\therefore$  The height of the table = 5 m.**

(2)  $v = u + at = u + gt$

$$= 0\text{ m/s} + (10\text{ m/s}^2 \times 1\text{ s})$$

$$= 10\text{ m/s}$$

**The velocity of the ball on reaching the ground = 10 m/s.**

83.

(a) An element X is Sodium (Na).

An element Y is Lithium (Li).

(b) Yes, these elements belong to the same group (group I) as they have the same number of valence electrons.

(c) Element X is more electropositive than Y. This is because while going down the group, electropositivity increases with increase in atomic size.

84.

(a) AC electric generator.

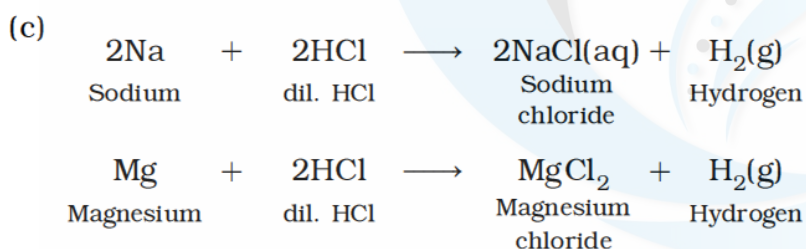
(b) Electromagnetic induction.

(c) It is used to generate alternating current.

85.

(a) If the number of electrons in the outermost orbit is less, then the metal is more reactive. Metal A contains one electron in the outermost shell, while metal B contains two electrons. Hence, metal A is more reactive than metal B.

(b) Metal A is sodium and metal B is magnesium. Reactions of Na and Mg with dil. HCl are,



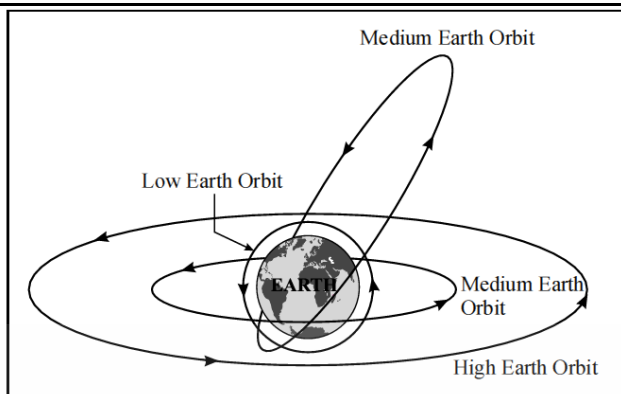
86.

(1) Orbit of a satellite is its path around the earth.

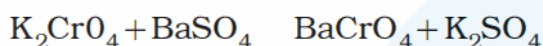
(2) On the basis of the height of the satellite : Orbit of a satellite can be HEO, MEO or LEO.

(a) **High Earth Orbit (HEO) satellite** : A satellite orbiting at a height equal to or greater than 35780 km above the earth's surface is called a High Earth Orbit satellite.

(b) **Medium Earth Orbit (MEO) satellite** : A satellite orbiting at a height between 2000 km and 35780 km above the earth's surface is called a Medium Earth Orbit satellite.



(c) **Low Earth Orbit (LEO) satellite** : A satellite orbiting at a height between 180 km and 2000 km above the earth's surface is called a Low Earth Orbit satellite.



87.

(a) The colour of the precipitate formed was yellow.

(b) The name of the precipitate is barium chromate.

(c) This reaction is a double displacement reaction.

88.

(a) Refraction of light.

(b) (1) The incident ray and the refracted ray are on the opposite sides of the normal to the surface at the point of incidence and all the three, i.e., the incident ray, the refracted ray and the normal are in the same plane.

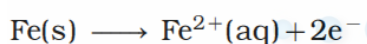
(2) For a given pair of media, the ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant (Snell's law). This constant is called the refractive index of the second medium with respect to the first medium.

[Note : Here, a ray means a ray of light.]

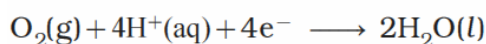
89.

The iron rust is formed due to electrochemical reaction. Different regions on iron surface become anode and cathode.

• Reaction on anode region :

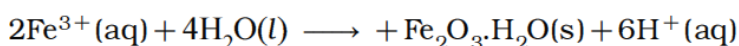


• Reaction on cathode region :



When  $\text{Fe}^{2+}$  ions migrate from anode region they react with water to form  $\text{Fe}^{3+}$  ions.

A reddish coloured hydrated oxide is formed from  $\text{Fe}^{3+}$  ions. It is called rust.



A way to prevent rusting by colouring with acrylic paints, Zn plating, galvanizing, anodizing, alloying, etc.





94.

- (a) The atomic number of this element is 20.
- (b) The group of this element is 2.
- (c) The element belongs to a period 4.

95.

**Data :**  $\frac{M_2 \text{ (planet)}}{M_1 \text{ (earth)}} = 3,$

$$D_1 \text{ (earth)} = 12800 \text{ km}$$

$$\therefore R_1 \text{ (earth)} = \frac{12800 \text{ km}}{2} = 6400 \text{ km} = 6.4 \times 10^6 \text{ m}$$

$$D_2 \text{ (planet)} = 25600 \text{ km}$$

$$\therefore R_2 \text{ (planet)} = \frac{25600 \text{ km}}{2} = 12800 \text{ km} = 1.28 \times 10^7 \text{ m}$$

$$g_1 \text{ (earth)} = 9.8 \text{ m/s}^2, g_2 \text{ (planet)} = ?$$

$$g = \frac{GM}{R^2} \quad \therefore g_1 = \frac{GM_1}{R_1^2}, g_2 = \frac{GM_2}{R_2^2}$$

$$\therefore \frac{g_2}{g_1} = \left(\frac{M_2}{M_1}\right) \left(\frac{R_1}{R_2}\right)^2$$

$$\therefore g_2 = g_1 \left(\frac{M_2}{M_1}\right) \left(\frac{R_1}{R_2}\right)^2$$

$$= 9.8 \text{ m/s}^2 \times 3 \times \left(\frac{6.4 \times 10^6 \text{ m}}{1.28 \times 10^7 \text{ m}}\right)^2 = \frac{9.8 \times 3}{4} \text{ m/s}^2 = 7.35 \text{ m/s}^2$$

**The acceleration due to gravity at the surface of the planet = 7.35 m/s<sup>2</sup>.**

96.

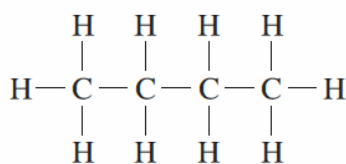
- (a) Hypermetropia or Farsightedness.
- (b) Hypermetropia is corrected using a suitable convex lens.
- (c) **Possible reasons of hypermetropia :** (a) The curvature of the cornea and the eye lens decreases. Hence, the converging power of the eye lens becomes less.  
(b) The distance between the eye lens and retina decreases (relative to the normal eye) and the focal length of the eye lens becomes very large due to the flattening of the eyeball.

**(Any one reason gives one mark)**

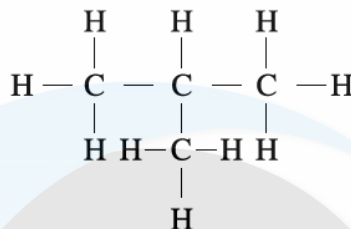
97.

The phenomenon in which compounds having different structural formulae have the same molecular formula is called structural isomerism.

Butane is represented by two different compounds as their structural formulae are different. The first compound is a straight chain compound and the second compound is a branched chain compound. These two different structural formulae have the same molecular formula i.e.  $C_4H_{10}$ .



(1) Straight chain



(2) Branched chain

98.

**Given :**  $m=3$  kg, distance travelled by the ball  $s=125$  m, initial velocity of the ball  $=u=0$  and acceleration  $a=g=10$  m/s<sup>2</sup>.

(a) Newton's second equation of motion gives

$$s = ut + \frac{1}{2} at^2$$

$$\therefore 125 = (0 \times t) + \frac{1}{2} \times 10 \times t^2 = 5t^2$$

$$\therefore t^2 = \frac{125}{5} = 25$$

$$\therefore t = 5 \text{ s}$$

The ball takes 5 seconds to reach the ground.

(b) According to Newton's first equation of motion final velocity,  $v = u + at$

$$= 0 + (10 \times 5) = 50 \text{ m/s}$$

The velocity of the ball on reaching the ground is 50 m/s

(c) Half time,  $t = \frac{5}{2} = 2.5$  s.

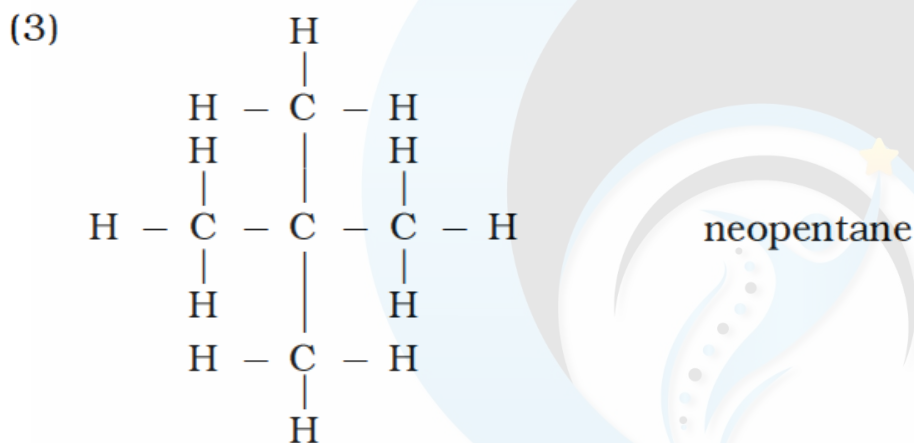
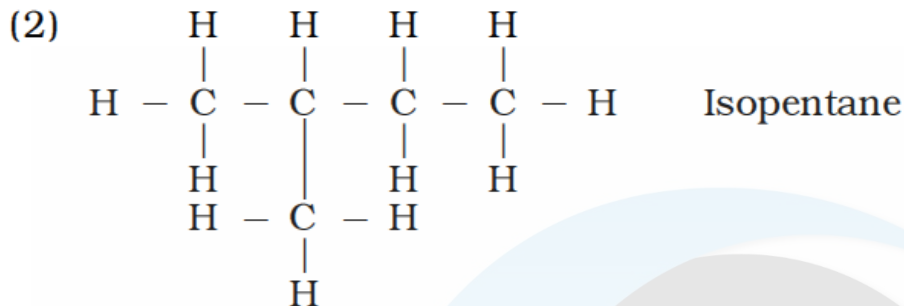
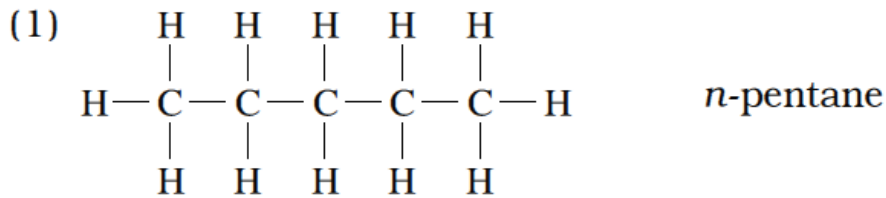
Ball's height at this time =  $s$ .

According to Newton's second equation  $s = ut + \frac{1}{2} at^2$

$$s = 0 + \frac{1}{2} \times 10 \times (2.5)^2 = 31.25 \text{ m.}$$

Thus, the height of the ball at half time =  $125 - 31.25 = 93.75$  m

99.



100.

**Data :**  $m_1 = 2 \text{ kg}$ ,  $\Delta T_1 = 20^\circ\text{C} - 0^\circ\text{C} = 20^\circ\text{C}$ ,  $c_1 = 1 \text{ kcal/kg}\cdot^\circ\text{C}$ ,  $L_1 (\text{ice}) = 80 \text{ kcal/kg}$ ,  $L_2$

(vaporization of ammonia) =  $341 \text{ cal/g} = 341 \text{ kcal/kg}$ ,  $m_2 = ?$

$$Q_1 (\text{heat lost by water}) = m_1 c_1 \Delta T_1 + m_1 L_1$$

$$= (2 \text{ kg} \times 1 \text{ kcal/kg}\cdot^\circ\text{C} \times 20^\circ\text{C}) + (2 \text{ kg} \times 80 \text{ kcal/kg})$$

$$= 40 \text{ kcal} + 160 \text{ kcal} = 200 \text{ kcal}$$

$$Q_2 (\text{heat absorbed by ammonia}) = m_2 L_2$$

$$= m_2 \times 341 \text{ kcal/kg}$$

According to the principle of heat exchange,  $Q_1 = Q_2$

$$\therefore 200 \text{ kcal} = m_2 \times 341 \text{ kcal/kg}$$

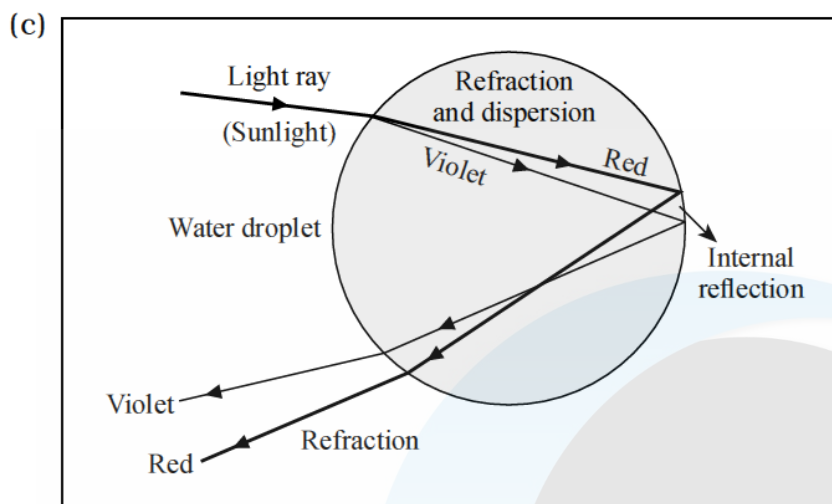
$$\therefore m_2 = \frac{200}{341} \text{ kg} = 0.5864 \text{ kg} = 586.4 \text{ g}$$

**586.4 g of ammonia are to be evaporated.**



101.

- (a) The natural process shown in the figure is formation of rainbow.  
(b) The phenomena observed in this process are refraction, internal reflection and dispersion of light.



102.

- Straight chain carbon compounds : (a) Propene (b) Butane.
- Branched chain carbon compounds : (c) Isobutane (f) Isobutylene.
- Ring carbon compounds : (d) Cyclopentane (e) Benzene.

103.

**Given :**

- (1) The mass of the planet ( $M$ ) is eight times the mass of the earth,  
i.e.  $8 \times 6 \times 10^{24}$  kg
- (2) The radius of the planet ( $R$ ) is twice the radius of the earth,  
i.e.  $2 \times 6.4 \times 10^6$  km
- (3)  $G = 6.67 \times 10^{-11}$  N·m<sup>2</sup>/kg<sup>2</sup>

Escape velocity for that planet

$$\begin{aligned} v_{esc} &= \sqrt{\frac{2GM}{R}} \\ &= \sqrt{\frac{2 \times 6.67 \times 10^{-11} \text{ N} \cdot \text{m}^2/\text{kg}^2 \times 8 \times 6 \times 10^{24} \text{ kg}}{2 \times 6.4 \times 10^6 \text{ m}}} \\ &= \sqrt{\frac{6.67 \times 10^{13} \times 8 \times 6}{64 \times 10^5}} \text{ m/s} \\ &= \sqrt{\frac{6.67 \times 3}{4}} \times 10^8 \text{ m/s} \\ &= \sqrt{\frac{20.01}{4}} \times 10^4 \text{ m/s} \\ &= \mathbf{2.237 \times 10^4 \text{ m/s}} \\ &= \mathbf{22.37 \text{ km/s.}} \end{aligned}$$

104.

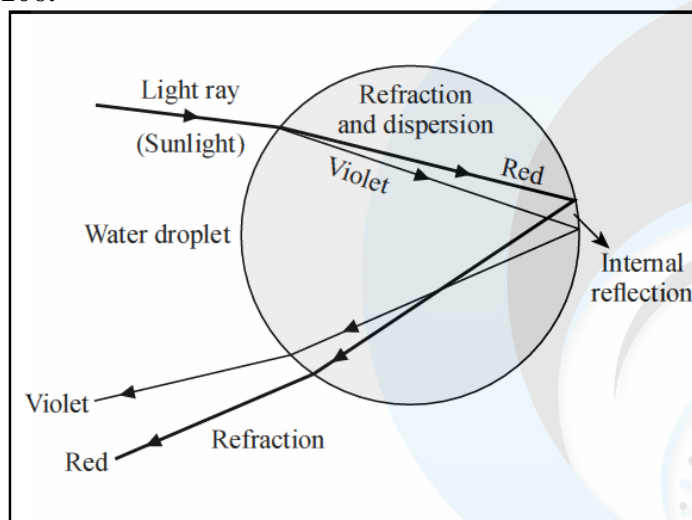
- (a) The colour of the precipitate is yellow.
- (b) The yellow precipitate formed is barium chromate.
- (c) The type of chemical reaction is double displacement.

105.

- (a) The process of concentration of bauxite is known as Bayer's process.
- (b) At the cathode :  $\text{Al}^{3+} + 3\text{e}^- \longrightarrow \text{Al}$  (Reduction)
- (c) The formula of cryolite is  $(\text{Na}_3\text{AlF}_6)$  or  $\text{AlF}_3, 3\text{NaF}$ .

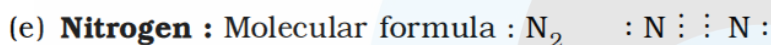
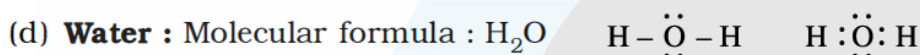
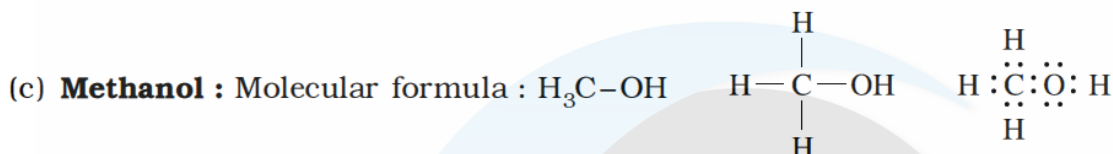
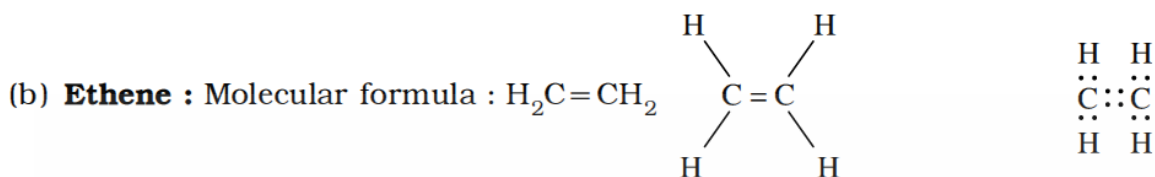
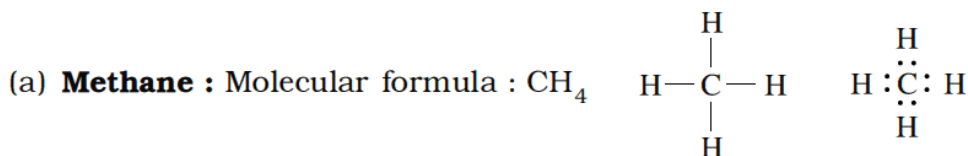
### Sure shots (5 Marks) Solutions

106.



- (1) A rainbow is a natural spectrum that appears in the sky following a rain shower. It is created by dispersion, internal reflection and refraction of sunlight by small water droplets in the atmosphere.
- (2) When sunlight is incident on a water droplet, there is (i) refraction and dispersion of light as it passes from air to water (ii) internal reflection of light inside the droplet and (iii) refraction of light as it passes from water to air.
- (3) The refractive index of water is different for different colours, being maximum for violet and minimum for red. Hence, there is dispersion of light (separation into different colours) as it passes from air to water.
- (4) The combined action of different water droplets, acting like tiny prisms, is to produce a rainbow with red colour at the outer side and violet colour at the inner side. The remaining five colours lie between these two. The rainbow is seen when the sun is behind the observer and water droplets in the front.

107.



108.

(a) Myopia or Nearsightedness

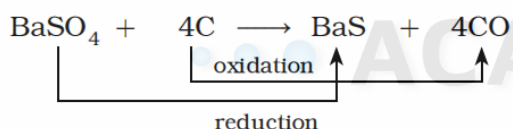
(b) **Possible reasons of the defect :**

- (1) The curvature of the cornea and the eye lens increases. The muscles near the lens cannot relax so that the converging power of the lens remains large.
- (2) The eyeball elongates so that the distance between the lens and the retina increases.

(c) **Correction of the defect :** This defect can be corrected using spectacles with concave lenses. A concave lens diverges the incident rays and these diverged rays can be converged by the lens in the eye to form an image on the retina.

109.

(a) (1) This is a redox reaction. In this reaction, the reduction of  $\text{BaSO}_4$  and oxidation of carbon take place simultaneously.



(2) **Example :**



*(Any one example)*

(b) (1) **Oxidation reaction :** The chemical reaction in which a reactant combines with oxygen or loses hydrogen to form the product is called oxidation reaction.

(2) **Reduction reaction :** The chemical reaction in which a reactant gains hydrogen and loses oxygen to form the product is called a reduction reaction.

110.

- (a) (1) This defect is called myopia (nearsightedness).  
(2) It is corrected using spectacles having concave lenses of appropriate power.
- (b) (1) This defect is called hypermetropia (farsightedness).  
(2) It is corrected using spectacles having convex lenses of appropriate power.
- (c) When a person cannot see nearby objects as well as distant objects clearly, bifocal lenses are used in spectacles.

111.

- (a) Esterification reaction.
- (b)  $\text{CH}_3 - \text{COO} - \text{CH}_2 - \text{CH}_3$
- (c) The property of product (Ester) formed have sweet odour.
- (d) (1) Making fragrances (2) Making flavouring agents.

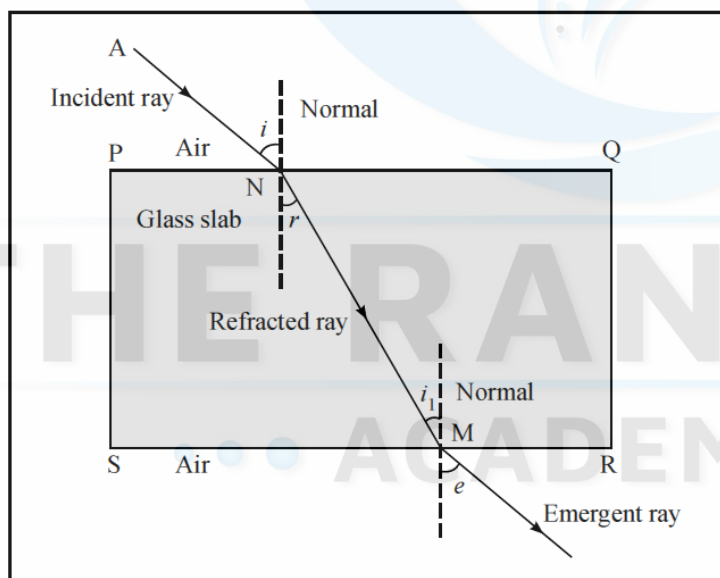
112.

(a) **Data :**  $n_g = \frac{3}{2}$ ,  $n_w = \frac{4}{3}$ ,  ${}_w n_g = ?$

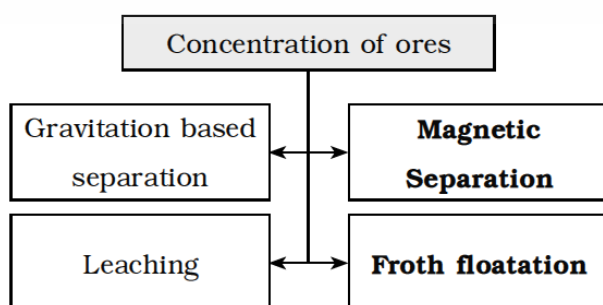
$$n_g = \frac{c}{v_g}, \quad n_w = \frac{c}{v_w}, \quad {}_w n_g = \frac{v_w}{v_g}$$

$$\therefore {}_w n_g = \frac{n_g}{n_w} = \frac{\frac{3}{2}}{\frac{4}{3}} = \frac{3 \times 3}{4 \times 2} = \frac{9}{8}$$

(b)



113.





- 
- (a) Pine oil is used in froth floatation method.
- (b) The finely powdered ore and vegetable oil, such as pine oil, eucalyptus oil are mixed with water for formation of froth. The pressurised air is blown through the mixture. The agitator is used as per the requirement. Bubbles are formed due to the blown air. A foam is formed from oil, water and air bubbles together, due to the agitating. This foam rises to the surface of the water and floats. Hence, this method is called froth floatation. Sulphide minerals float with the foam on water as they get and can be removed. The gangue particles are wetted by water, settles down at the bottom. This method is used for the concentration of zinc blend (ZnS) and copper pyrite ( $\text{CuFeS}_2$ ).

**114.**

- (a) The negative power indicates a concave lens,  
i.e. students are suffering from myopia.
- (b) The positive power indicates a convex lens,  
i.e. students are suffering from hypermetropia.
- (c) Most of the students suffer from myopia.
- (4) **Possible reasons of myopia :**
- (1) The curvature of the cornea and the eye lens increases. The muscles near the lens cannot relax so that the converging power of the lens remains large.
- (2) The distance between the eye lens and the retina increases as the eyeball elongates.

**115.**

- (a) The given elements belong to group 1.
- (b) The elements arranged vertically downward in an increasing order of atomic radii :
- |     |     |     |     |     |
|-----|-----|-----|-----|-----|
| Li  | Na  | K   | Rb  | Cs  |
| 152 | 186 | 231 | 244 | 262 |
- (c) This arrangement match with the pattern of the group 1 of the modern periodic table in an increasing order of atomic radii.
- (d) The biggest atom : Cs, The smallest atom : Li
- (e) While going down a group, atomic number increases, atomic radius increases. Therefore atomic size gradually increases.