

## Solution

### SCIENCE-1

#### Class 10 - Science & Technology - I

1. (i) Write the correct alternative.

i. **(c)** it bends towards the normal

**Explanation:**

it bends towards the normal

ii. **(a)** oxidation

**Explanation:**

oxidation

iii. **(d)** p-block

**Explanation:**

p-block

iv. **(b)** Refraction of light

**Explanation:**

Refraction of light

v. **(b)** zinc

**Explanation:**

zinc

(ii) Answer the following questions.

i. **(b)** False

**Explanation:**

False

ii. **(a)** True

**Explanation:**

True

iii. **(b)** False

**Explanation:**

An electric motor converts electrical energy to mechanical energy.

iv. Convex lens

Torch uses concave lens while camera uses convex lens.

v.  $\frac{Gm_1 m_2}{9 d^2}$

2. (i) Give scientific reasons. (Any 2)

i. i. When edible oil is left aside for long time, it undergoes air oxidation.

ii. Due to this, the taste and smell of oil changes and it becomes rancid. If food is cooked in this oil, its taste also changes.

iii. Thus, the oil will become unfit for consumption.

iv. The process of oxidation reaction of oil can be slowed down by storing it in airtight container. Hence, it is recommended to use airtight container for storing oil for long time.

ii. i. The electronic configuration of the outermost shell is same for all the elements belonging to the same group.

ii. So, the number of valence electrons for all the elements in a group is the same.

iii. The valency of an element is determined by the valence electrons.

Hence, elements belonging to the same group have the same valency.

iii. i. The heating devices such as iron, electric heater, toaster, boiler etc. works on the principle of heating effect of electric current.

ii. Alloys (such as nichrome) as compared to metals have higher resistivity.

iii. Unlike metals they can be heated to higher temperature.

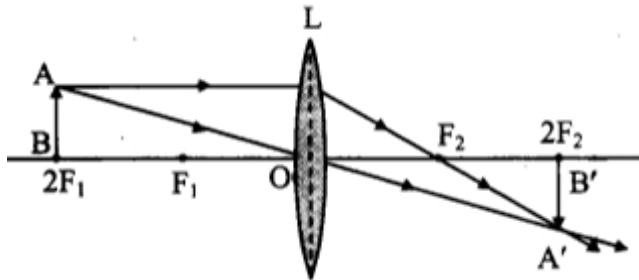
Hence, heating devices like electric heater, boiler, toaster etc., are made of alloys rather than a pure metal.

(ii) Answer the following questions. (Any 3)

i. **Uses of ethanol:**

- i. It is used as an important commercial solvent in industries. E.g. paints
- ii. Ethanol being good solvent, it is used in medicines such as tincture of iodine (solution of iodine and ethanol), cough mixture and also in many tonics.
- ii. i. **Kepler's first law:** The orbit of a planet is an ellipse with the sun at one of the foci.
- ii. **Kepler's second law:** The line joining the planet and the sun sweeps equal areas in equal intervals of time.
- iii. **Kepler's third law:** The square of orbital 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.
- iii. i. The vehicles with the help of which the satellites are placed in their specific orbits are called satellite launch vehicles.
- ii. **Indian satellite launch vehicle:** Polar Satellite Launch Vehicle (PSLV) developed by ISRO.

iv. Ray diagram:



v. Given: Speed of light in medium ( $v_2$ ) =  $1.5 \times 10^8$  m/s,  
velocity of light in vacuum ( $v_1$ ) =  $3 \times 10^8$  m/s

To find: Absolute refractive index ( $n$ )

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

Calculation: From formula,

$$n = \frac{3 \times 10^8}{1.5 \times 10^8} = 2$$

The absolute refractive index of the medium is 2.

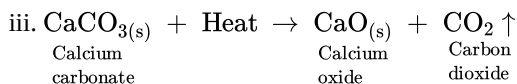
3. Answer the following questions. (Any 5)

- (i) i. Two metals that react with water: Potassium, sodium
- ii. Two moderately reactive metals: Zinc, iron
- iii. a. Most highly reactive metal: Potassium
- b. The most less reactive metal: Gold

(ii) i. The reaction type: Decomposition reaction

ii. Reactant: Calcium carbonate

Products: Calcium oxide, carbon dioxide



(iii) **Given:** Potential difference ( $V$ ) = 220 V ,

Power of bulb 1 ( $P_1$ ) = 50 W ,

Power of bulb 2 ( $P_2$ ) = 60 W ,

To find: Total current (I)

Formulae: i.  $P = VI$

ii.  $I = I_1 + I_2$

Calculation: Since both the bulbs are connected in parallel, the potential difference will be same.

From formula (i),

$$I_1 = \frac{P_1}{V} = \frac{50}{220} \text{ A}, I_2 = \frac{P_2}{V} = \frac{60}{220} \text{ A}$$

From formula (ii),

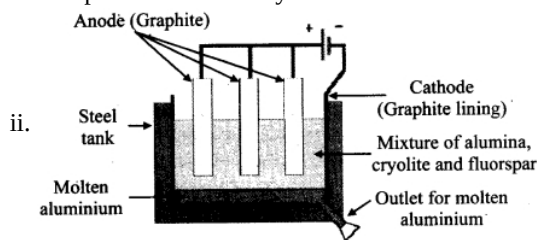
Total current is given by,

$$I = \frac{50}{220} + \frac{60}{220} = \frac{50+60}{220}$$

$$\therefore I = \frac{110}{220} = \frac{1}{2} = 0.5 A$$

The total current flowing in the main conductor is 0.5 A.

- (iv) i. The process is 'electrolytic reduction of alumina'.



- (v) i. Whenever an object moves under the influence of the force of gravity alone, then the object is said to be under free fall.  
ii. Free fall is possible in vacuum only.

- (vi) The halogen family belongs to group 17 of the periodic table.

Name of any four halogens are as follows:

Fluorine, Chlorine, Bromine and Iodine.

- (vii) The phenomenon shown in the figure is dispersion of light through prism.

- The process of separation of light into its component colours while passing through a medium is called the dispersion of light. Dispersion of sunlight can be observed using prism.
- As the sunlight enters the prism, each colour gets refracted through different angles.
- Hence, sunlight disperses into seven colours showing different colours of light.
- Out of these seven colours, red colour bends the least and hence, it is at the top of the spectrum.
- Violet colour bends the most and hence, it is at the bottom of the spectrum.
- Each colour emerges out along different paths and becomes distinct producing a spectrum of seven different colours.

- (viii) A manmade object which revolves around the earth or any other planet in a fixed orbit it is called an artificial satellite.

Depending on their functions, satellites are classified into following categories:

- Weather satellite:** These satellites are used to study and forecast weather conditions on the earth.
- Communication satellite:** These satellites use specific waves to establish communication between different locations in the world.
- Broadcast satellite:** These satellites are used to telecast different television programs all over the world.
- Navigational satellite:** These satellites help in locating any place on earth's surface by fixing the location in terms of its precise latitude and longitude.
- Military satellite:** These satellites collect information for security aspects of nation.
- Earth observation satellite:** These satellites are used in the study of forests, deserts, oceans, polar ice on earth's surface. These are also used in exploration and management of natural resources. They also collect information which guides us in case of natural calamities like flood and earthquake.

4. Answer the following question. (Any 1)

- Physical nature:** Ionic compounds are solids and are hard due to strong inter-ionic forces of attraction. They are generally brittle and break into pieces when pressure is applied.
  - Melting and boiling points:** Ionic compounds have high melting and boiling points as considerable amount of energy is required to break the strong inter-ionic forces of attraction.
  - Solubility:** Ionic compounds are generally soluble in water because water molecules orient in a particular manner around the ions which are separated by dissociation process. This results in new force of attraction between the ion and surrounding water molecules replacing the original intermolecular attraction. Ionic compounds are insoluble in kerosene and petrol because new attractive force cannot be established in these solvents.
  - Electrical conductivity:** Ionic compounds conduct electricity in molten state or in its aqueous solution. Conduction of electricity in these states is due to movement of charged particles (i.e., ions) towards the oppositely charged electrodes. However, in solid state, ionic compounds do not conduct electricity as movement of the ions is not possible due to their rigid structure.

(ii) Sr. No.	Common Name	Structural Formula	IUPAC Name
i.	Ethylene	$CH_2 = CH_2$	Ethene
ii.	Acetylene	$HC \equiv CH$	Ethyne

iii.	Acetic acid	$\text{CH}_3\text{-COOH}$	Ethanoic acid
iv.	Methyl alcohol	$\text{CH}_3\text{-OH}$	Methanol
v.	Acetone	$\text{CH}_3\text{-OH-CH}_3$	Propan-2-one

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