

Maharashtra Board Class 10 Science and Technology Part I

Solved Previous Year Question Paper -2016

SECTION A

1. (A) (a) Fill in the blanks:

[3]

i. The modern periodic table consists of _____ periods.

Answer: i. 7 periods

ii. The formulae of chloride of metal M is MCl_2 . The metal M belongs to _____ group.

Answer: ii. II group or 2nd group

iii. Corrosion can be prevented by using _____ solution.

Answer: iii. Anti-rust

(b) Find the odd one out:

[2]

i. Voltmeter, ammeter, galvanometer, thermometer.

Answer: i. Thermometer

As it is used to measure temperature, while other equipment such as voltmeter, ammeter and galvanometer are used to gauge the current and potential difference in a circuit.

ii. Loudspeaker, bar magnet, electric motor, microphone.

Answer: ii. Bar magnet

The reason being in all other devices, one form of energy is converted into another form of energy

(B) Choose the correct alternative and rewrite the following:

[5]

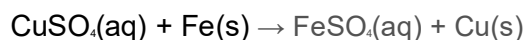
i. Reaction of iron nails with copper sulphate solution is an example of

- (A) Combination reaction
- (B) Decomposition reaction
- (C) Displacement reaction
- (D) Double displacement reaction

Answer: (C) Displacement reaction

Displacement reaction is when a more reactive element displaces another element of lesser reactivity from its compound.

When iron nails react with copper sulphate solution, iron (more reactive power than copper) displaces copper from the copper sulfate solution.

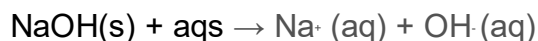


ii. Dilute NaOH can be tested with _____.

- (A) red litmus paper
- (B) blue litmus paper
- (C) lime water
- (D) Na_2CO_3

Answer: (A) red litmus paper

When sodium hydroxide is dissolved in water, the reaction that takes place is given as follows:



In this reaction, the OH^- ions that have dissociated convert the moist red litmus to blue colour.

iii. In series combination which remains constant?

- (A) Voltage
- (B) Current
- (C) Both current and voltage
- (D) Both are variables

Answer: (B) Current

In series combination, the same current is applied to both resistors.

iv. An object of 10 cm is placed in front of a plane mirror. The height of the image will be _____.

- (A) 5 cm
- (B) 15 cm
- (C) 20 cm
- (D) 10 cm

Answer: (D) 10cm

Image formed by a plane mirror will have the same height as the object

v. When a ray of light travels from air to glass slab and strikes the surface of separation at 90° , then it _____.

- (A) bends towards normal
- (B) bends away from normal
- (C) passes unbent

(D) passes in zigzag way

Answer: (C) Passes unbent

Since in this scenario, the angle of incidence(i) and the angle of refraction are both zero.

2. Answer the following questions (any five):

[10]

i. Define the following:

a. 1 volt PD

b. Electric power

Answer: i. a. If 1 joule of work is used in moving 1 coulomb of electric charge from a point to another, then the potential difference between the two points is calculated as 1 volt.

$$1 \text{ volt(V)} = 1 \text{ joule (J)} / 1 \text{ coulomb (C)}$$

i.b. The rate of doing a work or rather the work done per second is described as Electric power.

That is, Electric Power(P) = Electric work (w) / time (t) and S.I Unit of power is Watt.

Hence, if a current of 1 ampere flows via a metallic conductor at a potential difference of 1 volt, then the power obtained is 1 watt.

Therefore, 1 Watt = 1 Volt x 1 Ampere

ii. What major harm is done to human beings by air pollution?

Answer: Air pollution can have long term as well short term ill effects on human health. Given here are some short-term effects:

- I. Cause irritation to nose, mouth, throat and eyes
- li. Infections such as bronchitis and pneumonia to the respiratory tract
- lii. Headache, nausea and allergy
- Iv. Suffer from Asthma attacks
- v. Reduced lung functions

Meanwhile, also find here some long-term effects:

- i. Chronic pulmonary disease
- li. Cardiovascular disease
- lii. Lung cancer
- Iv. Premature death

iii. Calculate the focal length of a corrective lens having power +2D.

Answer: Here, focal length denoted by $f = +2D$

Apply the formula $\text{Power}(p) = 1/f$

Then $f = 1/p$

That is $f = \frac{1}{2} = 0.5m$

So the focal length of corrective lens is 0.5m

iv. Write two applications of sodium bicarbonate (baking soda).

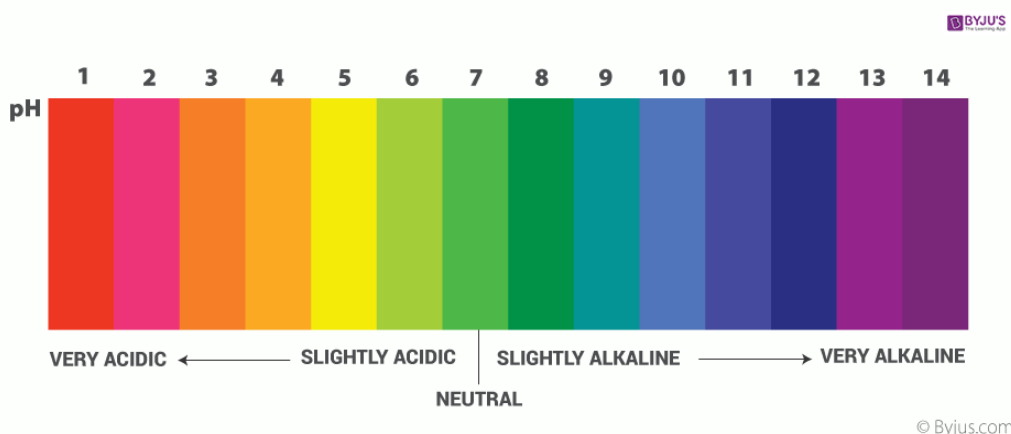
Answer: Sodium bicarbonate or the baking soda is used to make soft and spongy cakes, bread and dhoklas. Since it is an alkaline it also helps to reduce the acidity in the stomach. Other uses include help in preparing CO_2 gas as well as a content of fire extinguishers.

v. A simple microscope is used by watch repairers. Give reason.

Answer: Simple microscope provides a magnified and erect image on the same side as that of the object placed. So, with a simple microscope the watch repairer will be able to view even minute components of the watch very clearly by adjusting the distance between the watch and the lens and this helps in repairing the watch. For this reason, simple microscopes are used by watch repairers.

vi. Draw a neat and labelled diagram of pH scale.

Answer:



3. Answer the following questions (any five):

[15]

i. What are the main features of Mendeleev's periodic table?

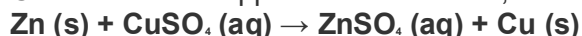
Answer: There are 118 elements present in Mendeleev's periodic table, out of which 118 elements and 94 elements are natural elements, while 24 elements are synthetic elements. Know more about [Mendeleev's periodic table](#) here.

ii. Define 'redox reaction'. Give one example.

Answer: In any chemical reaction, if the oxidation and reduction takes place simultaneously, then it is called redox reaction. Given here is the example of one redox reaction:

Reaction Between Zinc and Copper

This is a type of metal displacement reaction in which copper metal is obtained when zinc displaces the Cu^{2+} ion in the copper sulfate solution, as shown in the reaction below.



The oxidation half-reaction can be written as: $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$

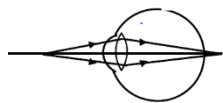
The reduction half-reaction can be written as: $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$

Thus, in this redox reaction, copper is displaced from the copper sulfate solution by zinc.

iii. Given below is a diagram showing a defect of the human eye. Study it and answer the following

Questions:

- Name the defect shown in the figure.
- Give reason for this defect of eye in human beings.
- Name the type of lens used to correct the eye defect.



Answer: a. Hypermetropia or nearsightedness is the illness depicted in the given image

b. Some of the reasons for the defect in human eyes are given below:

- The converging power of the eye lens decreases as the ciliary muscles become weak
- Eye defect could be caused by shortening of the eyeball and the flattening of the eye lens

c. A suitable convex lens can be used to correct the eye defect

iv. What is refraction of light? How is it related to the refractive index?

Answer: The phenomenon of change in the direction of propagation of light as it passes obliquely from one transparent medium to the other is known as refraction. For a given angle of incidence(i), the extent of refraction of light is varied for different media. If the refractive index of the second medium is more than the refractive index of the first medium, then the refractive ray will bend more towards the normal. However, if the refractive index of the second medium is lesser than the refractive medium of the first then the refracted ray bends away from the normal.

v. Explain how spectrum is formed.

Answer: When white light is passed through a glass prism, the light spreads out into a band of varied colours known as the spectrum of light. Now, when the white light is dispersed into seven rainbow colours by the glass prism, then each colour bends through separate specific angles with respect to the incident ray. The sequence of the colours are Violet, Indigo, Blue, Green, Yellow, Orange and Red. Of the colours, red light bends the least, even as violet bends the most. Therefore, the rays of each colour emerge along varied paths and appear distinct. Thus, the spectrum of seven different colours is formed.

vi. Suggest measures in the following situations:

- To avoid noise pollution in the classroom.
- To minimize electricity consumption at home.
- Bursting fire crackers in festivals and processions.

Answer: a. Given here are some tips to avoid noise pollution in the classroom:

- Students should remain quiet and not make noise when teacher is not in class
- Keep students occupied with activities like book reading, solo singing or storytelling so that they maintain the silence

- Monitors can inform the teachers about the students who make noise so that they get punishment
- Make the walls of the classrooms sound absorbent
- Add curtains that can be pulled and closed

b. Given below are the practices to be adopted to minimize electric consumption:

- Switch off the lights and fans when they are not being used
- Encourage use of CFL bulbs
- Use ACs only when unavoidable
- Allow sunlight and air to enter the house more, so as to reduce the consumption of electric items during day time
- Use solar heaters as an alternative to electric heaters

c. Steps to follow in order to minimize bursting crackers in festivals

- Avoid bursting crackers as it could result in air and noise pollution
- Use eco-friendly and noiseless crackers if required
- Do not burst crackers near hospitals or in other silent zones
- Ban the bursting of crackers post 10 pm.

4. Answer the following question (any one):

[5]

i. Find the expression for the resistors connected in series and write the two characteristics of it. (Draw figure).

Answer: A circuit is said to be connected in series when the amount of current flowing through the resistors are the same. Know more about [resistors in series and parallel](#) from here.

ii. Explain 'Electric motor' with the help of the following points:

a. Draw figure

b. Principle of Electric motor

c. Name any four appliances where an electric motor is used.

Answer: Find here the [working principle of an electric motor along with its applications](#) and image.

