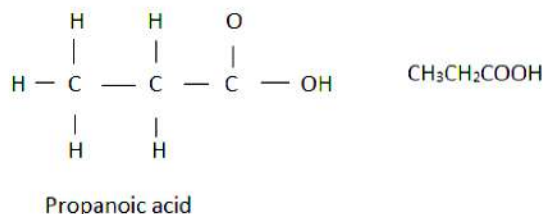


CBSE Class 10 Science Question Paper 2020 Set 3 Solution

SCIENCE BOARD SET 3

Solution:

1. Draw the structure of a carboxylic acid containing three carbon atoms.



2. $V = \frac{W}{Q}$. When 1 joule of work is done on 1 c (coulomb) of charge, to move it from one point to another in a circuit then it is said to be 1 volt.
3. Answer question numbers 3(a) – 3(d) on the basis of your understanding of the following paragraph and the related concepts.

Around the year 1800, only 30 elements were known. Dobereiner in 1817 and Newlands in 1866 tried to arrange the then known elements and framed laws which were rejected by the scientists. Even after the rejection of the proposed laws, many scientists continued to search for a pattern that correlated the properties of elements with their masses.

The main credit for classifying elements goes to Mendeleev. Mendeleev for his most important contribution to the early development of a periodic table of elements where in he arranged the elements on the basis of their fundamental property, the atomic mass and also on the similarity of chemical properties. The format of their hydrides and oxides were treated as basic criteria for the classification of the elements. However, Mendeleev's classification also had some limitations as it could not assign the position to isotopes. He also left some gaps in the periodic table.

3(a). State Mendeleev's periodic law.

Solution:

Mendeleev's periodic law states that, "The properties of element are the periodic function of their atomic masses."

(b) Why did Mendeleev leave some gaps in the periodic table?

Solution:

Mendeleev left some gaps in the periodic table, because he predicted the existence of few more element that had not been discovered at that time.

(c) If the letter 'R' was used to represent and of the elements in the group, then the hydride and oxide of carbon would respectively be represented as

- (i) RH_4, RO (ii) RH_4, RO_2 (iii) RH_2, RO_2 (iv) RH_2, RO

Solution:

(ii) RH_4, RO_2

(d) Isotopes are

- (i) Atoms of element with similar chemical properties but different atomic masses.
- (ii) Atoms of different elements with similar chemical properties but different atomic masses.
- (iii) Atoms of elements with different chemical properties but same atomic masses.
- (iv) Atoms of different elements with different chemical properties but same atomic masses.

Solution:

(i) Atoms of element with similar chemical properties but different atomic masses.

4. a. Separate dustbins can be set up at school to collect the plastic and the same can be recycled. Certain plastic wastes like bottles can be reused as useful products like pen holder in the school.

b. Plastic water bottles, grocery plastic bags

c. We can replace the use of plastic bags with cloth or jute bags. Unlike plastic bags, jute and cloth bag are reusable and environment friendly.

- 5. (D) Ozone gets decomposed by UV radiations.
- 6. (C) Various interlinked food chains in an ecosystem
- 7. (C) It detaches from the parent body as soon as it is produced

8. (A) Takes place in yeast during fermentation

(OR)

(A) Small intestine

9. (B)

10. (B) or (B)

11. (C) Valves ensure that the blood does not flow backwards.

12. (B) Maximum resistance is obtained when all resistors are connected in series.

$$R_{\max} = R_1 + R_2 + R_3 + R_4 + R_5$$

$R_1 = R_2 = R_3 = R_4 = R_5 = R$ given

$$R_{\max} = 5R \quad \therefore R = \frac{1}{5}$$

$$= 5 \times \frac{1}{5}$$

(a) $R_{\max} = 1 \Omega$

(OR)

By Joule's law of heating.

$$H = I^2 R t$$

$$H \propto R$$

\therefore When $R \rightarrow R/2$

$\therefore H \rightarrow H/2$ As H is also reduced by half.

13. A

14. (a)

SECTION – B

15. The movement of plant growth towards or against the gravity is called geotropism. If the movement is towards gravity, its termed as positive geotropism and away from gravity is known as negative geotropism.



16. The contraction of the muscles causes the movement. The movement of Cheetah can be described using the concept of reflex action.

17. (a) How is a soap different from a detergent in composition?

Soaps are the long chain carboxylate salts of Na (or) K, whereas detergents are the synthetic surfactants usually alkylbenzene sulfonates. (Na (or) K salts of sulphonic acid of benzene)

(b) Design an activity to show that a detergent works well with all types of water while a soap does not.

- Take two test tubes with about 10 ml of hard water in each.
- Add five drops of soap solution to one and five drops of detergent solution to the other.
- Shake both test tubes for the same period.

OBSERVATION:

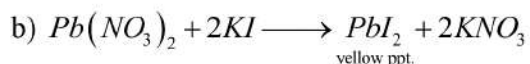
Curdy solid will be formed in the test tube in which soap solution is added, whereas foam will be formed in the test tube in which detergent solution is added. The above observation shows that, the detergent dissolves in all types of water, whereas a “scum” is formed by soap solution with hard water (ie) precipitate.

18. Lead Nitrate solution is added to a test tube containing potassium iodide solution.

- Write the name and colour of the compound precipitated.
- Write the balanced chemical equation for the reaction involved.
- Name the type of this reaction justifying your answer.

Solution:

a) Lead Iodide (PbI_2) and it is bright yellow precipitate.



c) It is a double displacement reaction

(OR)

What happens when food materials containing fats and oils are left for a long time?

List two observable changes and suggest three ways by which this phenomenon can be prevented.

Solution:

When food materials containing fats and oils are left for a long time they become rancid (i.e.) fat and oil present in them get oxidised. (Oxidation of food material takes place).

Two observable changes are

(i) They start giving unpleasant smell.

(ii) Their taste changes.

Rancidity can be prevented by,

(i) By adding anti-oxidants to foods containing fats and oils.

(ii) Rancidity can be prevented by storing food in air tight containers. (Slows down oxidation)

(iii) Packing fats and oil foods in nitrogen gas.

19. List three differentiating features between the process of galvanization and alloying.

Galvanisation	Alloying
(i) It is a method of protecting steel and iron from rusting by coating them with a thin layer of zinc.	It is a very good method of improving the properties of a metal. We can get the desired properties by this method.

BOARD SET 3

CLASS:

ALL CENTRE

	Ex: Iron is mixed with 'Ni' & 'Cr', we get stainless steel which is hard and does not rust.
(ii) It doesn't modify the property of the metal	It modify the property of the metal.
(iii) If the coating of zinc is removed then rusting takes place.	Alloy will not rust.

OR

Compare in tabular form the reactivity's of the following metals with cold and hot water.

a) Sodium b) Calcium c) Magnesium

Sodium	Calcium	Magnesium
$(i) \underset{(s)}{2Na} + \underset{(l)}{2H_2O} \longrightarrow$ $\underset{(aq)}{2NaOH} + \underset{(g)}{H_2} + \text{heat energy}$	$Ca + 2H_2O \longrightarrow$ $\underset{(aq)}{Ca(OH)_2} + \underset{(g)}{H_2}$	$Mg + 2H_2O \longrightarrow$ $\underset{(aq)}{Mg(OH)_2} + \underset{(g)}{H_2}$
The reaction of 'Na' with cold water is very violent. It is highly exothermic. It also reacts with hot water in the same way.	The reaction of calcium with cold water is less violent. Calcium starts floating because the bubbles of hydrogen gas formed stick to the surface of the metal. It also reacts with hot water as well.	Magnesium does not react with cold water. It reacts with hot water to form magnesium hydride. It also starts floating as the bubbles of H ₂ gas stick to its surface.

20. Variation is the difference in the DNA among individuals .

Variation is beneficial for species at times as they help in adapting to the surrounding environment .Progeny formed as a result of sexual reproduction exhibits variation because ,sexual reproduction involves two parents ,it also involves fusion of gametes .

OR

Inherited trait :Genetic trait that is passed on from one generation to another is known as inherited trait .

These traits are coded in the DNA

Example : Height ,skin color

Acquired trait : The traits that are developed during ones lifetime .

Since these are not coded on DNA ,they are not passed on from one generation to another.

Example: An offspring born to a bodybuilder will not be having large muscles.

21. (i) When white light is passed through a prism, it splits into its seven constituent colour (VIBGYOR)
 (ii) Splitting of white light into its constituent color is called dispersion.

22. $u = -10 \text{ cm}$

$f = -15 \text{ cm}$

a) $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

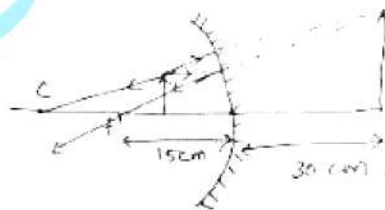
$$\frac{1}{-15} = \frac{1}{v} + \frac{1}{(-10)}$$

$$\frac{1}{v} = \frac{-1}{15} + \frac{1}{10}$$

$$v = 30 \text{ cm}$$

(b) $m = \frac{h_i}{h_o} = \frac{-v}{u} = \frac{-30}{-10} = 3$ (Enl arg ed)

(c) Virtual d erect.

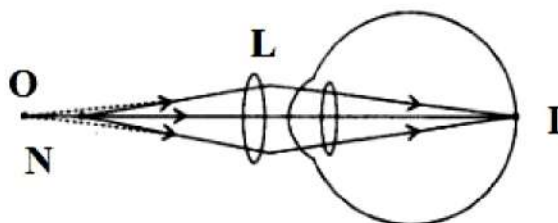


23. Hypermetropia (or) long-sighted ness is the defect of vision due to which a person cannot see near by objects clearly & can see the distant objects clearly

Causes:-

1. Due to 10 W converging power of eye lens (because of large focal length)

2. Due to eye-ball being too short correction



Hypermetropia (for-sightedness) is corrected by using convex lenses

24.

$$\mu_{xy} = \frac{\mu_x}{\mu_y} = \frac{2}{3} \Rightarrow \mu_x = \frac{2}{3} \mu_y$$

$$\mu_{yz} = \frac{\mu_y}{\mu_z} = \frac{4}{3} \Rightarrow \mu_z = \frac{3}{4} \mu_y$$

$$v_x = 3 \times 10^8 \text{ ms}^{-1}$$

$$\mu_{zx} = ? \quad v_y = ?$$

$$\mu_{zx} = \frac{\mu_z}{\mu_x} = \frac{\frac{3}{4} \mu_y}{\frac{2}{3} \mu_y} = \frac{3}{4} \times \frac{3}{2} = \frac{9}{8}$$

We know, $\mu \propto \frac{1}{v}$

$$\therefore \mu_{xy} = \frac{\mu_x}{\mu_y} = \frac{v_y}{v_x}$$

$$\Rightarrow \frac{2}{3} = \frac{v_y}{3 \times 10^8}$$

$$v_y = 2 \times 10^8 \text{ ms}^{-1}$$

SECTION – C

25. A cloth strip dipped in onion juice is used for testing a liquid “x”. the liquid “x” change its colour. Which type of an indicator is onion juice.

The juice “x” turns blue litmus red. List observations the liquid “x” will show on reacting with the following.

- a) Zinc granules
b) Solid sodium carbonate

Write the chemical equations for the reactions involved.

Solution:

Onion juice is an olfactory indicator.

a) $Zn + 2HCl \longrightarrow ZnCl_2 + H_2$. When a burnt match stick is brought close to the mouth of the test tube, the gas burns with a pop sound.

b) $Na_2CO_3 + 2HCl \longrightarrow 2NaCl + H_2O + CO_2$

CO_2 released turns lime water milky.

(OR)

Define water of crystallisation. Give the chemical formula for two compounds as examples. How can it be proved that the water of crystallisation makes a difference in the state and colour of the compounds?

Solution:

Water of crystallisation is the fixed number of water molecules present in one formula unit of a salt.

Eg: $CuSO_4 \cdot 5H_2O$, $FeSO_4 \cdot 7H_2O$ (Green vitriol)
(Blue vitriol)

By heating these crystals they lose their water molecules and hence result in change in state and colour takes place.

26. (a) Alloy: An alloy is a homogeneous mixture of two (or) more metals (or) a metal and a non-metal

Amalgam: A mixture of mercury with another metal especially to fill holes in teeth.

“Solder” is the alloy used for welding electric wires together.

Composition of solder – Lead and tin.

- (b) (i) Brass – copper and zinc
Iron,
(ii) Stainless steel – Nickel and chromium

(iii) Bronze – copper and tin .Primarily with copper, 12 – 12.5% of tin and with other metals and sometimes non-metals (or) metalloids.

Brass and Bronze have lower electrical conductivity than their constituents, where as stainless steel does not corrode easily as iron does.

27. Sol.

(a) Fleming's left hand rule: If we stretch the forefinger, middle finger and the thumb of our left hand mutually perpendicular to each other as shown in figure such that the forefinger indicates the direction of the magnetic field and the middle finger indicates the direction of current, then the thumb will indicate the direction of motion (i.e., force) on the conductor.

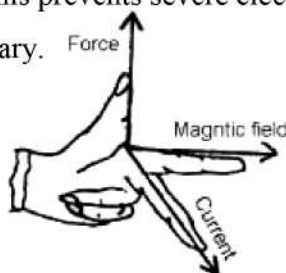
(b) (i) Appliances to be connect in parallel.

(ii) Each appliance has a separate switch to ON/OFF the flow of current through it.

(iii) Fuse connected to avoid damage.

(c) A fuse is an electrical safety device that operates to provide overcurrent protection of an electrical circuit. Its essential component is a metal wire or strip that melts when too much current flows through it thereby stopping or interrupting the current. So it is also called a safety device.

(d) The metallic body of electric appliances is connected to the earth wire so that any leakage of electric current is transferred to the ground. This prevents severe electric shock to the user. That is why earthing of the electrical appliances is necessary.



28. a. Fertilisation – Zygote formation – Morula – Blastocyst – Implantation – Embryo development – Foetus – Parturition

b.If no fertilisation occurs then the endometrial thickening sheds off as blood. The endometrial thickening along with unfertilised egg is released through the vagina as blood. This is know as menstruation .

29. a. The process of taking in nutrients is called nutrition. Nutrients are required for building the various parts of the body, thus enabling growth and repair of the body. The nutrients also provide us with energy.

b. Peristalsis causes the movement of food inside the alimentary canal.

c. The major nutrient in herbivores is cellulose. It takes a longer time to digest cellulose. Thus herbivores have a longer intestine than carnivores.

d. Due to the concentrated HCL there would be perforations in the stomach walls if there is no mucus secreted.

30.

$$(a) I_1 = \frac{V}{R_1} = \frac{6}{10} = 0.6A$$

$$I_2 = \frac{V}{R_2} = \frac{6}{20} = 0.3A$$

$$I_3 = \frac{V}{R_3} = \frac{6}{30} = 0.2A$$

$$(b) I = I_1 + I_2 + I_3 = 0.6 + 0.3 + 0.2$$

$$I = 1.1A$$

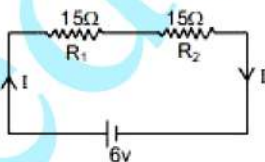
(c) Effective resistance

$$V = IR$$

$$R = \frac{V}{I} = \frac{6}{1.1} = 5.45\Omega$$

(OR)

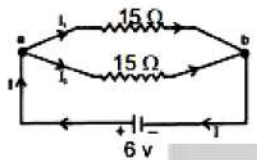
In series,



$$R_s = R_1 + R_2 = 30\Omega$$

$$P_s = \frac{V^2}{R_s} = \frac{6 \times 6}{30} = 1.2W$$

In parallel



$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R_p} = \frac{1}{15} + \frac{1}{15} = \frac{2}{15}$$

$$R_p = \frac{15}{2} \Omega$$

$$R_p = 7.5 \Omega$$

$$P_p = \frac{V^2}{R_p} = \frac{36}{7.5} = 4.8$$

$$\frac{P_s}{P_p} = \frac{1.2W}{4.8} = \frac{1}{4}$$