EDUGROSS
WISDOMISING KNOWLEDGE

CBSE Class 10 Science Question Paper 2020 Set 1 Solution

SCIENCE BOARD EXAM – HINTS AND SOLUTIONS

SECTION – A **Each 1 mark**

1. Write the number of valence electrons present in nitrogen atom $\left({}^{14}_{7}N\right)$

Solution: 5

2. Induced current:

Current produced in a conductor due to change in magnetic flux through the coil is called induced electric current.

Phenomena: Electromagnetic induction.

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 for classifying elements goes to 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. (C) Valves ensure that the blood does not flow backwards.

6. (A) Takes place in yeast during fermentation

(OR)

(A) Small intestine

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

7. Fertilization is the process of

(B) Fusion of nuclei of male and female gamet

8. **(A)**

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

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

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

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

(OR)

(B)

By Joule's law of heating.

$H = I^2 Rt$

$H \alpha R$

$\therefore$ When $R \rightarrow R/2$

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

9. **(C)** Fleming's right hand rule shows the direction of induced current when conductor moves in a magnetic field.
10. **(B) (OR)(B)**
11. C)Various interlinked food chains in an ecosystem
12. (D) Ozone gets decomposed by UV radiations.
13. Assertion & Reasoning que:

Assertion (A): Following is a balanced chemical equation for the action of steam iron:

$3Fe + 4H_2O \longrightarrow Fe_3O_4 + 4H_2$

Reason (R): The law of conservation of mass holds good for a chemical equation.

Solution:

(a) Both 'A' and (R) are true and (R) is the correct explanation of the assertion (A).

14. A

SECTION – B **(10 × 3 = 30 Marks)**

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

(a) Write the name and colour of the compound precipitated.

(b) Write the balanced chemical equation for the reaction involved.

(c) Name the type of this reaction justifying your answer.

Solution:

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

b) $Pb(NO_3)_2 + 2KI \longrightarrow \underset{\text{yellow ppt.}}{PbI_2} + 2KNO_3$

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.

16. 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. 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) $\underset{(s)}{2Na} + \underset{(l)}{2H_2O} \longrightarrow$ $\underset{(aq)}{2NaOH} + \underset{(g)}{H_2}$ + heat energy	$\underset{(s)}{Ca} + \underset{(l)}{2H_2O} \longrightarrow$ $\underset{(aq)}{Ca(OH)_2} + \underset{(g)}{H_2}$	$\underset{(s)}{Mg} + \underset{(l)}{2H_2O} \longrightarrow$ $\underset{(aq)}{Mg(OH)_2} + \underset{(g)}{H_2}$
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.

17. Carbon a member of group 14, forms a large number of carbon compounds estimated to be about three million. Why is this property not exhibited by other elements of this group?

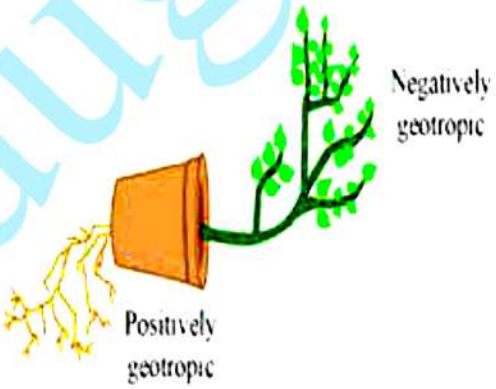
Solution:

The reason is the formation of strong bonds by carbon due to its small size. This enables the nucleus to hold on to the shared pairs of electrons strongly. The bonds formed by elements having larger atoms of this group are much weaker and also the carbon has the unique ability to form bonds with other atoms and carbon giving rise to larger molecules. This property is catenation.

18.

	Location	**Function**
(a) Pituitary gland	Brain (Below hypothalamus)	Control all the other endocrine gland. Secrete growth horomones
(b) Thyroid gland	Neck	Secretes thyroxin, maintains metabolism
(c) Pancreas	Abdomen	Secretes insulin and glucagon; maintains the blood glucose level

19. 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.



20. The change in the characteristics of a species over a long period of time and occurs after several generations is called evolution.

Progress is made by organism in a species in order to adapt to its environment. Progress doesn't result in the formation of complete new species where as evolution does. Let us consider human being as an example. We *Homo sapien* with the invent of technology have progressed in our life style but this hasn't caused an evolution of a new species. Therefore evolution cannot be equated to progress.

(OR)

Organisms that have similar structures but adapt for new functions exhibit divergent evolution. These structures are known as homologous organs. Let us consider forelimbs of horse and man. The structure of the forelimbs of horse and man are similar but horse uses forelimbs to walk whereas man does not use the fore limbs to walk. Therefore the function is different but the similar structure is a proof that they share common ancestor.

21. u = - 10 cm

f = - 15 cm

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

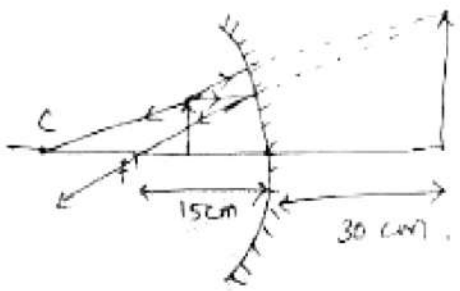
$$\frac{1}{-15}=\frac{1}{v}+\frac{1}{(-10)}$$

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

$$v = 30cm$$

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

(c) Virtual d erect.



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

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

$$\upsilon_x = 3\times10^8\, ms^{-1}$$

$$\mu_{zx} = ? \qquad \upsilon_y = ?$$

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

We know, $\mu \alpha \frac{1}{\upsilon}$

$$\therefore \quad \mu_{xy} = \frac{\mu_x}{\mu_y} = \frac{\upsilon_y}{\upsilon_x}$$

$$\Rightarrow \frac{2}{3} = \frac{\upsilon_y}{3\times10^8}$$

$$\upsilon_y = 2\times10^8\, ms^{-1}$$

23. **(a)** Presbyopia:

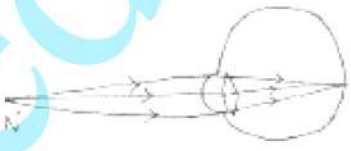
→ With increase in age, the capalrility of eye to focus on near by object reduces due to decrease in power of accommodation.

→ A person suffering from this defect can neither see near by object (nor) distant object clearly.

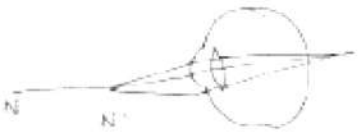
(b) It happens when ciliary mucles become weak

(c) Bi of cal lens

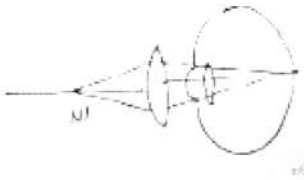
(a) Near point of presbyopia



(2) presbyopia eye



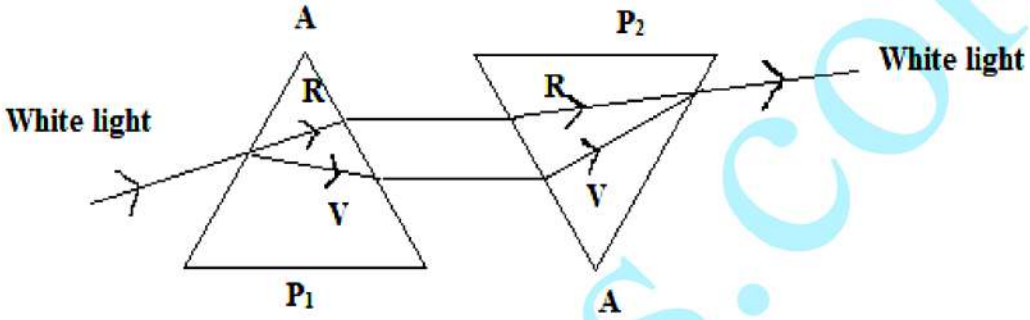
(3) correction



24. (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.

(iii) If another identical prism is placed in inverted position in front of a prism then dispersed colours obtained from 1st prism get recombine to produce white light.



SECTION – C **(6 × 5 = 30 Marks)**

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: $\underset{\text{(Blue vitriol)}}{CuSO_4 .5H_2O}, FeSO_4 .7H_2O$ (Green vitriol)

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

26. a) i) Write two properties of gold which make it the suitable metal for ornaments.

ii) Name two metals which are the best conductors of heat.

iii) Name two metals which melt when you keep them on your palm.

b) Explain the formation of ionic compound CaO with electron – dot structure.

Atomic numbers of calcium & oxygen are 20 & 8 respectively.

Solution:

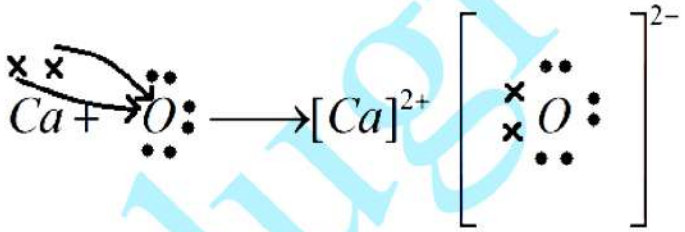
a) (i) It is ductile, lustrous and malleable.

ii) Aluminium and copper

iii) Gallium and Caesium

(b) $\underset{2,8,8,2}{Ca} \longrightarrow \underset{2,8,8}{Ca^{2+}} + 2e^-$ $\qquad O + 2e^- \longrightarrow \underset{2,8}{O^{2-}}$ (2,6)

Formation of CaO



27. 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 herbivore 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.

28. Fertilization in flower :

As the pollen grains land on the stigma, the pollen tube formation occurs.

The male gametes travel through the pollen tube and enters into the ovule through the micropylar end.

The female gamete and male gamete fuses to form the zygote and this process is called fertilization.

After fertilization (i) Ovary becomes the fruit

(ii) Ovule becomes the seed.

(OR)

(a) Puberty is the period during which an adolescent reaches sexual maturity and becomes capable of reproduction.

(b) (i) Testes → For production of sperms

(ii) Seminal vesicle → Its secretion contributes to 60% of the seminal plasma. Provides the fluid medium for the sperms to swim.

(iii) Vas deferens → Carries the sperm from testes to penis.

(iv) Urethra → A common pathway for both urine and sperms.

(c) Testes is located in scrotum outside the abdominal cavity as it provides temperature required for the synthesis of sperm.

(d) Sperms are motile as they have a tail for locomotion. The mitochondria in the mid piece of the sperm provides the energy for the tail to locomote.

29.

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

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

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

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

$I = 1.1A$

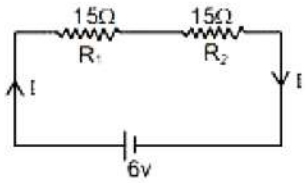
(c) Effective resistance

$\upsilon = IR$

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

(OR)

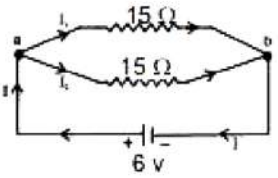
In series,



$$R_5 = R_1 + R_2 = 30\Omega$$

$$P_s = \frac{\upsilon^2}{R_3} = \frac{6\times 6}{30} = 1.2W$$

In parallel



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

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

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

$$R_p = 7.5\Omega$$

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

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

30. 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 transfered to the ground. This prevents severe electric shock to the user. That is why earthing of the electrical appliances is necessary.