

Solution

SCIENCE

Class 10 - Science

Section A

1.
(c) 1, 2
Explanation:
The balance chemical equation is:
$$\text{Al}_2\text{O}_3 + 2\text{NaOH} \rightarrow 2\text{NaAlO}_2 + \text{H}_2\text{O}$$
Thus the value of x and y will be 1 and 2 respectively.

2.
(d) B, C and D
Explanation:
When sodium sulphate reacts with barium chloride solution, barium sulphate which is an insoluble product (i.e., precipitate) and two moles of sodium chloride are formed.
$$\text{Na}_2\text{SO}_4(\text{aq}) + \text{BaCl}_2(\text{aq}) \rightarrow \underset{(\text{insoluble})}{\text{BaSO}_4(\text{s})} \downarrow + 2\text{NaCl}(\text{aq})$$
Here, exchange of ions takes place.

3.
(b) Blue litmus turns red and red litmus remains red.
Explanation:
Blue litmus turns red and red litmus remains red.

4. **(a)** Butyne, Ethene, Propyne
Explanation:
Butyne, Ethene, Propyne

5. **(c)** High reactivity
Explanation:
To make cooking utensils, copper is used because it has various physical properties that make it a suitable choice for this purpose.

6. **(d)** 5, 6 or 7
Explanation:
5, 6 or 7

7. **(c)** ketone
Explanation:
The functional group of butanone is ketone.

8. **(c)** IV
Explanation:
IV

9. **(a)** 9 : 3 : 3 : 1
Explanation:
9 : 3 : 3 : 1
10. **(b)** petals only
Explanation:
petals only
11. **(c)** Gregor Mendel
Explanation:
Gregor John Mendel is considered as the father of genetics as he laid down the principles or laws of inheritance for the first time. Though his works were based on plants but the laws governing inheritance patterns are also applicable to humans and hence we call them as “ Mendel's Laws of Inheritance”.
12. **(a)** It is a growth related movement.
Explanation:
It is a growth related movement.
13. **(a)** out of the page
Explanation:
According to Fleming's Left-Hand Rule, the current flows in the direction of the alpha particle, the field points in the direction of the paper's left side, and the force is directed out of the paper by the thumb.
14. **(a)** ohm · metre
Explanation:
ohm · metre
15. **(b)** The tigers will die
Explanation:
The tigers will die
16. **(c)** Photosynthesis
Explanation:
A food chain in an ecosystem always starts with photosynthesis. The autotrophs or the producers are at the first trophic level. They fix up the solar energy and make it available for heterotrophs or the consumers.
17. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation:
 CaCO_3 on heating gives CO_2 and CaO .
18. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation:
Smaller Y chromosome, does not decide the gender of the child. Its presence is important not the size. Thus both assertion and reason are true, but reason is not the correct explanation of the assertion.
19. **(c)** A is true but R is false.
Explanation:

According to Fleming's left-hand rule, the direction of the magnetic force on a moving charge is always perpendicular to the magnetic field.

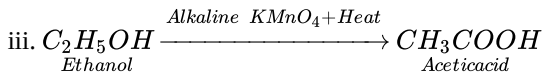
20. (a) Both A and R are true and R is the correct explanation of A.

Explanation:

Harmful chemicals accumulate progressively at each trophic level. Since man is at the apex of all the food chains, the concentration of harmful chemicals may be more in human beings. The phenomenon involved is known as biomagnification.

Section B

21. i. 5 g potassium permanganate is dissolved in 100 ml of water for preparing a 5% solution of KMnO_4 .
ii. Alkaline potassium permanganate is adding oxygen to alcohol and converting that to an acid. Hence, it is acting as an oxidising agent. When KMnO_4 is added, initially colour disappears because coloured permanganate ions of potassium permanganate are consumed to oxidise ethanol. When an excess of KMnO_4 is added, colour does not change because there is no more alcohol left for the reaction.

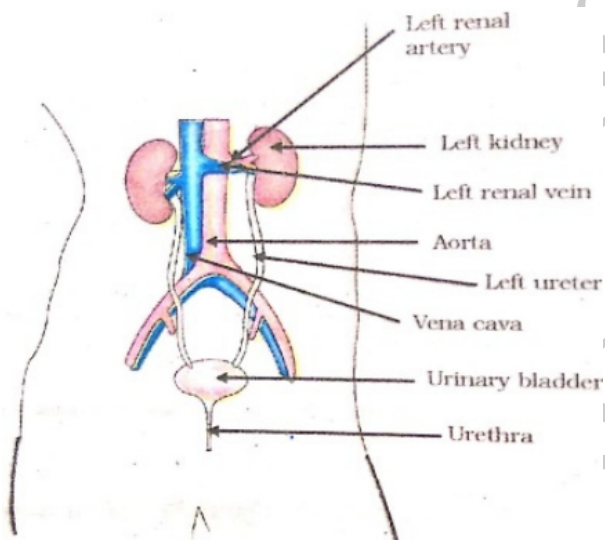


22.



Process - Budding

23.



OR

The systemic circulation provides the functional blood supply to all body tissue. It carries oxygen and nutrients to the cells and picks up carbon dioxide and waste products. Systemic circulation carries oxygenated blood from the left ventricle, through the arteries, to the capillaries in the tissues of the rest body. From the tissue capillaries, the deoxygenated blood returns through a system of veins to the right atrium of the heart where again oxygenated process start.

24. Concave mirror is used in a solar furnace. The solar furnace is placed at the focus of the large concave reflector the concave reflector focuses the Sun's heat rays on the furnace and a high temperature is achieved.
25. Only 10% of the energy entering a particular trophic level of organisms is available for transfer to the next higher trophic level is termed as 10% law. This flow of energy is unidirectional.

Green plants capture 1% of energy of the sunlight available to them as food energy by the process of photosynthesis. When taken up by primary consumers, a great deal of energy is lost as heat to the environment and only about 10% of food eaten is turned into its own body and made available next level of consumers. Thus only 10% can be taken as the amount of organic matter present at each step and reaches the next level of consumers.

OR

Agriculture is the process of cultivation of food plants, fibre, etc.

Increased use of pesticides and other insect or disease repellents for soils and standing crops is a harmful practice that adversely

affects the environment and its components. These chemicals get mixed with soil and water and are absorbed by growing plants. Through the food chain they reach all the trophic levels causing various threats to them.

26. The phenomenon of splitting up of white light into its constituent colours as it passes through a prism is known as dispersion. Light rays bend towards the normal when they enter the prism. Since white light consists of 7 colours it splits into 7 bands of colour.

Section C

27. The element with an atomic number of 20 is calcium (Ca).

The electronic configuration of calcium is: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$.

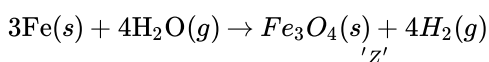
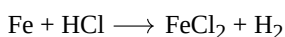
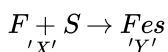
Calcium is a metal because it is located in Group 2 (or Group IIA) of the periodic table, which consists of metals known as alkaline earth metals.

The valency of calcium is +2.

The compound that calcium forms with chlorine is calcium chloride. The chemical formula for calcium chloride is CaCl_2 .

28. i. Qualities exhibited by Ankit are scientific knowledge, awareness, helpfulness etc.
ii. The container becomes porous when blue vitriol, i.e. CuSO_4 solution is kept in it because iron being more reactive displaces copper from copper sulphate (blue vitriol) solution and itself forms green coloured ferrous sulphate.

OR



29. The lining of the alimentary canal has muscles that contract rhythmically so that the food can be pushed down through it easily. This action is known as peristalsis. These movements of muscles help the passage of food through the gut.

30. i. Genetics is the study of mechanism by which variations are created and inherited. These variations are far more in sexual reproduction due to crossing over in meiosis and also new diploid recombination.
ii. Evolution is used for studying the development of new species of organisms from the existing ones through accumulation of variation.

31. Given focal length f of lens 20 cm

To obtain real and magnified image, the object should be placed between F_1 and $2F_1$, So the range will be from 20 cm to 40 cm of convex lens.

32. Rate at which electrical energy is dissipated or consumed in an electric circuit.

$$\text{Power } P = VI$$

$$= \frac{V^2}{R} \quad \left(I = \frac{V}{R} \right)$$

$$P = \frac{V^2}{R} = \frac{(200V)^2}{400\Omega} = 100W$$

33. a. Here, 2Ω , 3Ω and 6Ω resistance are connected in series.

$$R_{eq} = R_1 + R_2 + R_3$$

$$= 2 + 3 + 6$$

$$= 11$$

$$\text{b. } \frac{1}{R_{eq}} = \frac{1}{2} + \frac{1}{3} + \frac{1}{6}$$

$$\frac{1}{R_{eq}} = \frac{3+2+1}{6}$$

$$\frac{1}{R_{eq}} = \frac{6}{6}$$

$$R_{eq} = 1\Omega$$

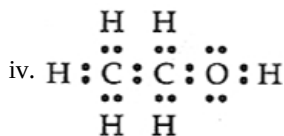
Section D

34. i. The bonds which are formed by the sharing of an electron pair between two atoms are known as covalent bonds. Since the electrons are shared between atoms and no charged particles are formed, such covalent compounds are generally poor conductors of electricity.
ii. In the case of carbon, it has four electrons in its outermost shell and needs to gain or lose four electrons to attain noble gas configuration. If it were to gain or lose electrons:

- a. It could gain four electrons forming C^{4-} anion. But it would be difficult for the nucleus with six protons to hold on to ten electrons.

b. It could lose four electrons forming C^{4+} cation. But it would require a large amount of energy to remove four electrons leaving behind a carbon cation with six protons in its nucleus holding on to just two electrons.

iii. Electron dot structure of ethanol is as follows:

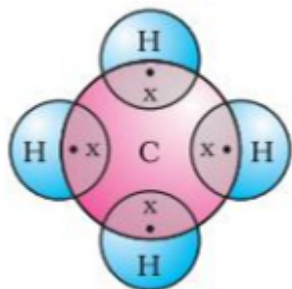


v. Heteroatom in following compound is

- Oxygen
- Chlorine

OR

a. Electron dot structure of Methane



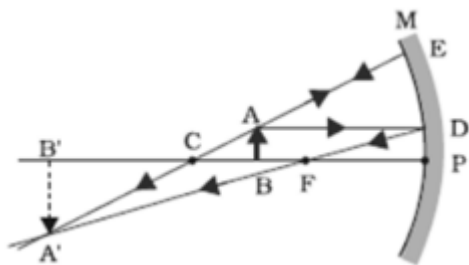
- Alcohol / -OH
 - Aldehyde / -CHO
 - Due to incomplete combustion in air, high temperature required for welding is not achieved. Due to excessive soot formation, welding is hampered.
35. a. a. **Barrier method:** Where physical barriers like condoms (worn over penis), diaphragm (used by females), cervical cap and copper-T (an IUCD) are used.
- b. **Chemical method:** Spermicidal applications by women, vaginal pills or oral contraceptive pills (OCPs) are used. OCPs are hormonal preparations which alter the hormonal level in female body. Use of OCPs is not meant for males.
- c. **Surgical method:** Portion of vas deferens in male (vasectomy) or portion of fallopian tube in females (tubectomy) is cut or ligated. This stops release of gametes, preventing fertilisation.
- b. Selective Medical Termination of Pregnancy (MTP) of female foetus using amniocentesis is the main reason behind decline female-male sex ratio in our country. This is because many sections of our society considered girl child as a burden. That is why Government of India prohibited prenatal sex determination by law.
- Its benefits in the long run:
- Generating awareness about girls being equal helping hands in the family income.
 - Banning prenatal sex determination tests.
 - Banning certain ill practices in our society like dowry system.
- c. Bacterial diseases transmitted through sexual contact:
- (i) Gonorrhoea (ii) Syphilis
- Viral diseases : (i) Warts (ii) HIV-AIDS

OR

	Nervous mechanism	Hormonal mechanism
i.	Transmits information through electrical impulses.	Transmits information through blood cells.
	Affects only a particular part of the body.	Affect different organs of the body
	Signal transmission is fast	Signal transmission is slow

- When light is coming from one side of the plant, auxin diffuses towards the shaded side of the shoot. This concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light. Thus, the plant appears to bend towards the light.
36. i. The student should use a Concave mirror because a concave mirror produces real images.
- ii. To get magnified image, the student should put the candle flame between f and $2f$.

iii. The ray diagram will be as follows:



iv. Yes, concave mirror can be used to obtain a diminished image. When the object is placed beyond $2f$, then the image formed will be diminished one.

OR

Given,

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

$$u = -50\text{ cm}$$

$$h = 6\text{cm}$$

Lens formula

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

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

$$\frac{1}{v} = \frac{1}{30} - \frac{1}{50}$$

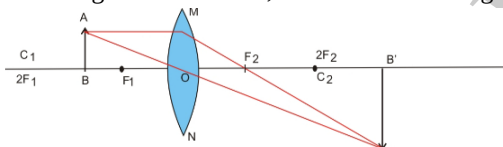
$$v = +75\text{ cm}$$

$$m = \frac{v}{u} = \frac{h_i}{h}$$

$$\frac{75}{-50} = \frac{h_i}{6}$$

$$h_i = -9\text{cm}$$

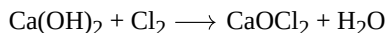
The image formed is real, increased and enlarged.



Section E

37. i. Carbonic acid does not form an acidic salt.
- ii. Sodium bicarbonate, commonly known as baking soda or bicarbonate of soda, is a chemical compound with the formula NaHCO_3 .
- iii. Ca(OH)_2 treatment with chlorine to obtain bleaching powder.

OR



Washing soda is used for removing the permanent hardness of the water.

38. i. In plants, **chemical coordination** occurs with the help of plant hormones (Phytohormones).
- ii. *Mimosa pudica*'s leaves drop down when we touch it. It is due to the turgor pressure difference between the upper and lower halves of the base of the petiole. Its other name is "touch-me-not" or "chui-mui".
- iii. Turgor movement is the movement due to the difference in turgidity of the cells in the lower half and the upper half of pulvinus (petiole of a leaf).

OR

The movements which are in a particular direction in relation to the stimulus are called tropic movements. Tropic movements happen as a result of the growth of a plant part in a particular direction. For example; the shoot usually grows in the direction of sunlight. This is called positive phototropic movement.

39. i. Fleming's left-hand rule is used to determine the direction of force on electron i.e., in south direction.
- ii. Force = $q(\mathbf{V} \times \mathbf{B}) = qVB \sin\theta$
Where, θ is angle between velocity and magnetic field.

So, $\sin\theta$ is maximum when θ is 90°

or velocity is perpendicular to magnetic field.

- iii. As the direction of current is taken opposite to the direction of motion of electrons, therefore, current from the motion of electron and proton is in the same direction, i.e., from bottom to top. Now, according to Fleming's left-hand rule, the electron and the proton experience forces both pointing into the plane of paper.

OR

We know that both the directions are perpendicular, thus for force direction = ?

Using Fleming's left-hand rule,

Direction of force is perpendicular to the direction of magnetic field and current.

Thus direction of force is opposite to electron motion into the page at 90°

SATISH SCIENCE
ACADEMY