CBSE Class 10 Science

Sample Paper 03 (2020-21)

Solution

Section A

1. When quicklime or calcium oxide (CaO) reacts with water, slaked lime [$Ca(OH)_2$] is formed. During this reaction a large amount of heat is released. So, this reaction is an exothermic reaction.

   $CaO + H_2O \rightarrow Ca(OH)_2 + Heat$

   OR

   Reactions in which two or more reactants combine to form one product are called combination reaction.

   $2Fe+3Cl_2 \rightarrow 2FeCl_3$

   Iron reacts with chlorine to form ferric chloride is a combination reaction.
2. Catalyst accelerates/decelerates the rate of a chemical reaction without itself being consumed in the reaction.
3. (d) 6

   Explanation: The number of C-H bonds in ethane (C_2H_6) molecule is 6. Carbon is tetravalent. Each carbon atom forms 3 single bonds with 3 hydrogen atoms.
4. Yes, a plane mirror can be called a spherical mirror because it also obeys the laws of reflection just like the spherical mirror . The only difference is that the reflecting surface of spherical mirror is curved while that of plane mirror is straight having infinite focal length and infinite centre of curvature. It can be **called a spherical mirror** of radius of curvature equal to infinity.
5. The phenomenon responsible for increasing the apparent length of the day by 4 min is **atmospheric refraction.**
6. When an electric current is passed through an aqueous solution of an acid, hydrogen is produced at cathode.

   OR

Tomato is Acidic. Tomatoes are generally considered a high acid food item with a pH 4.1.

7. We are given, I = 0.5 A; t = 10 min = 600 s.

   we have,

   $Q = I \times t$

   $= 0.5\ A \times 600\ s$

   $= 300\ C$

   Hence, the amount of electric charge that flows through the circuit is 300 C

8. The divergence of magnetic field lines indicates the decrease in strength of the magnetic field near the ends of the solenoid.

9. $R_s = 0.2 + 0.3 + 0.4 + 0.5 + 12 = 13.4\Omega$

   $I = \frac{V}{R} = \frac{9}{13.4} = \frac{90}{134}$ or or I = 0.6716A

   When in series, the current passing through each resistor is equal to the current in the circuit.

   ∴ Current through 12Ω = 0.6716 A

OR

Voltmeter measures potential difference.

10. Amoebas can be found in fresh water, salt water, soil and in some animals - including humans. They feed off bacteria, algae and other protozoa.

11. Leaves show following adaptations for photosynthesis:
    a. Flat surface to allow greater exposure to sunlight
    b. Presence of chlorophyll to trap solar energy
    c. Larger number of stomata on lower surface

OR

    a. Blood vascular system
    b. Lymphatic system

12. Many practices are introduced at wide scale to reduce, reuse and recycle the waste products now a days, in order to keep environment clean and sustaining, two of them are,
    i. Composting, collecting and dumping of biodegradable waste in a pit to produce manure.
    ii. Biogas can be produced by the processing of waste products, which can be used as a

source of energy in farms.

OR

We should eat plants to get more calories of heat.

13. Glucose and oxygen are the end products of photosynthesis.
14. (a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
15. (a) A is false but R is true.

OR

(b) Both A and R are true but R is not the correct explanation of the assertion.

16. (a) Both A and R are true and R is correct explanation of the assertion.
17. i. (d) conversion of pyruvate to lactic acid
    ii. (c) Only Carbon dioxide(yes)
    iii. (a) Lack of oxygen
    iv. (b) To stop air from getting in
    v. (a) Milky
18. i. (a) - Blue
    ii. (c) - Plaster of Paris
    iii. (a) - Five
    iv. (d) - $CaSO_4.1/2H_2O$
    v. (b) - gypsum
19. i. (d) 30 Ω
    ii. (d) all of these
    iii. (a) resistance decreases
    iv. (b) $10^{-8}\,\Omega$m to $10^{-6}\,\Omega$m
    v. (b) Alloys does not oxidise readily at high temperature
20. i. (d) stong electrostatic force
    ii. (b) transfer of electron
    iii. (d) both (a) and (b)
    iv. (b) 18
    v. (b) Electrical conductivity in solid state

Section B

21. Common features of respiratory organs in aquatic and terrestrial animals are:
    - Large surface area for exchange of gases.
    - Thin-walled for easy diffusion.
    - Rich supply of blood for transport of gases.

    OR

    The tracheal wall is supported by 'C' - shaped cartilaginous rings because they prevent the trachea from collapsing.
22. High temperature inhibits photosynthetic action as the enzymes associated with photosynthesis can function only at optimum temperature. At high temperature the enzymes get denatured.
23. The organic compound A which is a constituent of many medicines and act as antifreeze with the molecular formula C_2H_6O is ethanol (CH_3CH_2OH). Ethanol is oxidised to ethanoic acid (B) upon reaction with alk. $KMnO_4$.

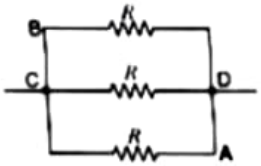
$$\underset{\text{Ethanol}}{\underset{A}{CH_3CH_2OH}} \xrightarrow{\text{Alk. } KMnO_4 + \text{Heat}} \underset{\text{Ethanoic acid}}{CH_3COOH}$$

24. i. Sprinkling common salt on icy roads, ice/snow lowers the freezing point of ice due to which the ice or snow melts down. The softened ice/snow can be easily cleared from the roads.
    ii. Calcium chloride can be used in place of common salt. It can lower the freezing point up to -55°C.
    iii. The students are caring, helping, have supporting nature and have scientific knowledge.
25. Here ${}^nD_a = 2.5$, ${}^ng_a = 1.5$, $V_g = 2 \times 10^8\ ms^{-1}$; $V_D = ?$

    ${}^nD_a = \frac{{}^nD_a}{{}^ng_a}$, ${}^nD_a = \frac{2.5}{1.5} = \frac{5}{3}$ But ${}^nD_a = \frac{V_g}{V_D}$

    Therefore $\frac{V_g}{V_D} = \frac{5}{3}$

    $\therefore V_D = \frac{3}{2} \times 2 \times 10^8 = 1.2 \times 10^8 ms^{-1}$
26. The point C is connected to B and the point D is connected to A. Therefore, three identical resistors, each having resistance R, are connected in parallel and the equivalent circuit diagram is shown in the figure. If the equivalent resistance is R then



$$\frac{1}{R'_3} = \frac{1}{R} + \frac{1}{R} + \frac{1}{R}$$

$$= \frac{3}{R}$$

$$\Rightarrow R' = \frac{R}{3}$$

27. i. In first generation progeny (F_1 progeny) all plants with round seeds.

    ii. In second generation progeny (F_2 progeny) all plants with round and wrinkled seeds.

    iii. (i) Tall and drawrf plants.

    (ii) Yellow and green seeds.

    (iii) White and purple flowers.

OR

i. Acquired traits are those characteristics which an individual develops during its lifetime due to the effect of environmental factors. These traits are not inheritable.

ii. Inherited traits are those features, which are genetically transmitted from parents to their offsprings and which cannot be varied by environmental factors.

iii. Professional ethics and social responsibility are the values shown by the doctor.

28. i. The primary consumers are the organisms who directly feed on the producers. In the given food web, rabbits and mice are the primary consumers.

    ii. The foxes feed on the rabbits and mice. If all the foxes are killed then there will be no direct predator of rabbits and mice, hence the number of rabbits and mice will increase in the given ecosystem and with increasing number of primary consumers the producers will decline as more comsumers will feed on more producers, which will disturb the ecological balance.

29. Digestive enzymes break-down the various complex components of food into simple and soluble form so that they can be absorbed and assimilated by the body easily.

30. Carbohydrates are found in fruit, vegetables, grains and other starches. Digestion for carbohydrates actually starts in the mouth. Enzymes in saliva begin to break down carbohydrates. Carbohydrates travel through the esophagus, stomach and enter the small intestine.

    In the small intestine, carbohydrates get further broken down into single carbohydrate

units called monosaccharide. These single molecules get absorbed across the intestine wall and are sent through the blood stream. Carbohydrate in the blood is in the form of a monosaccharide called glucose.

The more carbohydrate eaten at one time, the more glucose is going to be released into the blood after digestion.

31. i. Neon (Ne)and argon (Ar) contain completely filled valence shells, hence their valency is zero. Both are monoatomic gases.
    ii. These elements do not possess any tendency to lose or gain electrons due to fully filled outer most shells. Thus, both are non-reactive monoatmic gases.
32. Since., The given three elements A, B and C with similar properties have atomic masses X, Y and Z respectively and mass of Y is approximately equal to the average mass of X and Z. Therefore, this arrangement of elements in which the atomic mass of middle element is almost the mean of atomic masses of first and third elements is known as Dobereiner's triads.

    e.g. Ca (Atomic mass = 40), Sr (Atomic mass = 88) and Ba (Atomic mass = 137)

    Atomic mass of Sr = $\frac{40+137}{2}$ = 88.5

    Other example is Li(7), Na (23) and K (39).
33. The scattering of the light by particles, that it encounters in its path, is called Tyndall effect. When a beam of light enters a smoke-filled dark room through a small hole, then its path becomes visible to us. The tiny dust particles present in the air of room scatter the beam of light all around the room. Thus, scattering of light makes the particles visible. Tyndall effect can also be observed when sunlight passes through a canopy of a dense forest, where, the tiny water droplets in the mist scatter the light.
34. Object distance, u = - 15 cm

    Focal length, = - 10 cm

    Object size, h = 1 cm

    Image distance, v= ?

    i. Position of image

    From mirror formula, $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

    We have, $\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$

    Putting values, we get $\frac{1}{v} = \frac{1}{-10} - \frac{1}{-15}$

    $= \frac{-3-(-2)}{3} = -\frac{1}{30}$

    The image is formed at a distance 30 cm on the side of the object Negative sign

indicates that object and image are on the same side.

ii. Nature of image: The image is in front of the mirror, its nature is real and inverted.

Size of image: From the expression for magnification,

$m = \frac{h'}{h} = -\frac{v}{u}$

We have $h' = -h \times \frac{v}{u}$

putting values, we get $h' = -1 \times \frac{-30}{-15}$

= -2

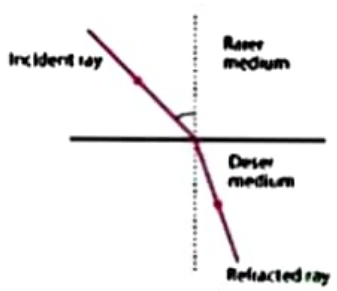
The image formed has size 2 cm and negative sign means inverted and real and enlarged.

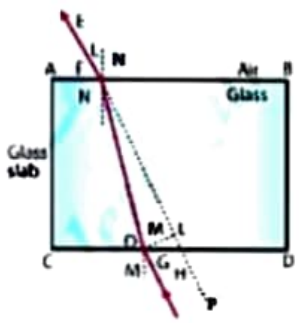
OR

Laws of refraction are as follows:

i. Incident ray, refracted ray and normal at the point of incidence lie in the same plane.

ii. Ratio of sine of incidence and sine of refraction is constant for the given color and pair of media.





35. i. Amoeba reproduces by binary fission and Plasmodium reproduces by multiple fission.

ii. Fission in which the parent cell divides to form two similar daughter cells is called binary fission whereas fission in which the parent cell divides to produce more than two daughter cells is called multiple fission.

iii. Planaria reproduces by regeneration in which an organism is split into several parts, most of the parts will develop into complete organisms.

iv. In budding, an organism produces an outgrowth on its body surface, which then matures and develops into a new individual.

v. In Rhizopus, the thick-walled spores have the capacity to develop into new individuals under suitable conditions.

36. The word "electromagnetic" is related to the interrelation between electric current I and magnetic field B. While "Induction" is the process of giving rise to something. So the process of generation of an electric current I from magnetic effects B is called electro-magnetic induction.

Three factors which affects the electro-magnetic induction are:

i. The number of turns in a coil
ii. The strength of magnet used and
iii. The speed by which magnet is pushed into the coil.

Fleming's right-hand rule used to determine the direction of induced current.

Electric generator is based on the principle of electromagnetic induction.

OR

a.
- Fleming's left-hand rule.
- Adjust your hand in such a way that the forefinger points in the direction of magnetic field and the centre finger points in the direction of current, then thumb gives the direction of force acting on the conductor

b. Electric motor.