Class X
SCIENCE
MARKING SCHEME-2019

SECTION A

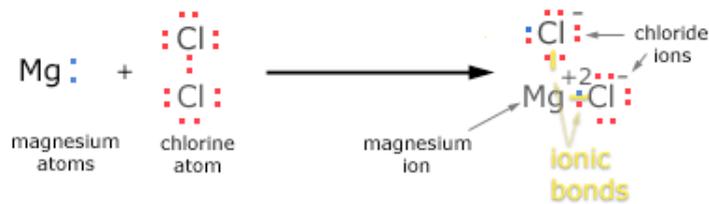1. Glucose/Amino acids   1

2. Coliform bacteria   1

SECTION B

3. Mg   - 12   2, 8, 2
   Cl   - 17   2, 8, 7   1

magnesium atoms + chlorine atom → magnesium ion, chloride ions, Mg^{+2}, ionic bonds

The 2 electrons lost by a magnesium atom are gained by chlorine atoms to produce a magnesium ion and 2 chloride ions.

$MgCl_2$ 1

Solution of Magnesium Chloride conduct electricity because an ionic compound dissociates into ions when dissolved in water and hence conduct electricity.   1

4. (Fertilization results in formation of zygote).   2

Zygote divides several times, to form an embryo. The ovule develops a thick coat and is into seed. The ovary grows rapidly and ripens to form the fruit.

5. n = $\frac{speed\ of\ light\ in\ vaccum\ (c)}{speed\ of\ light\ in\ benzene\ (v)}$

   We have   2

   $\therefore v = \frac{3\ x\ 10^8}{1.50}$m/s = 2 x 10^8 m/s

   % decrease =

   $$\frac{(3-2)\times10^{\wedge}8}{3\times10^{\wedge}8}\times100\% = 33.33\%$$
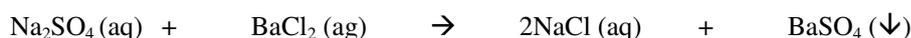
OR

From Snell's law

$$n = \frac{\sin i}{\sin r} = \frac{c}{v}$$

Since c and $\sin i$ are constant therefore $\sin r \propto v$

Therefore velocity of light is maximum in medium C.

SECTION C
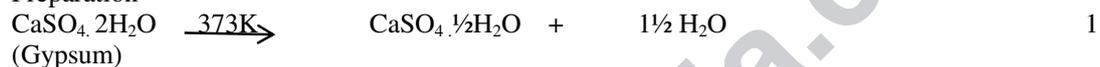
6. A white precipitate is formed.   3

   Na_2SO_4 (aq) + $BaCl_2$ (ag)   → $2NaCl$ (aq)   + $BaSO_4$ (↓)
   Doubled Displacement reaction
   It is a reaction in which there is an exchange of ions between the reactants.

7. Plaster of Paris $CaSO_4 . \frac{1}{2}H_2O$ 1

   Calcium Sulphate Hemihydrate
   Preparation
   $CaSO_4 . 2H_2O \xrightarrow{373K} CaSO_4 . \frac{1}{2}H_2O$ + $1\frac{1}{2} H_2O$ 1
   (Gypsum)

   Precaution
   Gypsum should not be heated above 373 K otherwise it will form $CaSO_4$.   1

OR

Sweet tooth leads to tooth decay. Which is caused by the action of Bacteria on food particles remaining in the mouth and acid is formed. The pH of the mouth falls below 5.5 and the tooth enamel dissolves resulting in cavities Toothpastes are generally basic, they neutralise the excess acid produced in the mouth and prevent tooth decay.

8.   X – 2, 8, 6
a) Since 'X' has three energy shells and period number of an element is equal to the number of energy shells, X belongs to 3rd period.   1
b) X has 6 valence electrons it belongs to group 16.   1
c) Valency will be 2. To acquire noble gas configuration it will gain 2 electrons.   1

9. i) less intake of Iodine (in the diet)   3
   ii) will lead to gigantism
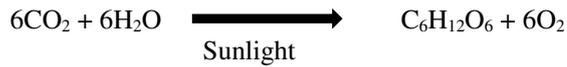   iii) timely secretion of testosterone

10. Just before Starch test – Pale yellow   3
Just after Starch test – Blue black
                        Chlorophyll

$$6CO_2 + 6H_2O \xrightarrow{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$$

O_2 is obtained from water (H_2O), as splitting of water results in formation of Hydrogen (used for making glucose) and oxygen (by-product).

11. $m = -\dfrac{v}{u}$ 3

$-1 = \dfrac{-(-30)}{u}$

$\therefore u = -30$ cm

Using mirror formula: u = -30 cm, v = -30 cm

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

$\dfrac{1}{f} = \dfrac{1}{-30} + \dfrac{1}{-30}$

f = -15 cm

Now u' = - 10 cm,   f = - 15 cm
Using mirror formula

$\dfrac{1}{v'} = \dfrac{1}{f} - \dfrac{1}{u'}$

$v' = +30 \, cm$

For ray diagram refer NCERT Page 166 Figure 10.7.

OR

Power of a lens is the degree of convergence of divergence of light rays achieved by a lens.

Lens L_1: $f_1 = \dfrac{100}{P_1} = \dfrac{100}{+10} = +10$ cm ;   Convex lens

Lens L_2: $f_2 = \dfrac{100}{P_2} = \dfrac{100}{+5} = +20$ cm   ;   Convex lens

Lens L_3 : $f_3 = \dfrac{100}{P_3} = \dfrac{100}{-10} = -10$ cm   ;   Concave lens

Lens L_2 will form a virtual and magnified image of an object placed at 15 cm from the convex lens because concave lens can never form virtual and magnified image of an object and convex lens form such image only when the object is placed between the optical centre and principle focus of the convex lens.

For diagram refer NCERT Page 181 figure 10.16 (f).

12. $R_1 = \frac{V^2}{P_1} = \frac{220 \times 220}{100} = 484 \ \Omega$ 3

$R_2 = \frac{V^2}{P_2} = \frac{220 \times 220}{200} = 242 \ \Omega$

In series:
$R_S = R_1 + R_2 = 484 + 242 = 726 \ \Omega$

$\therefore I_S = \frac{V}{R_s} = \frac{220}{726} = \frac{10}{33} \ A = 0.30 \ A$

     In parallel:

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

$$= \frac{1}{484} + \frac{1}{242}$$

$$R_p = \frac{484}{3} \Omega$$

$$I_P = \frac{V}{R_p} = \frac{220 \times 3}{484} = \frac{30}{22} \ A = 1.36 \ A$$

13. $R_a = \rho \frac{l}{A}$ 3

$R_b = \rho \left(\frac{3 \ L}{A/3} \right) = 9 \frac{\rho L}{A} = 9 \ R_a$

$R_c = \rho \frac{L/3}{3 \ A} = \frac{1}{9} \frac{\rho L}{A} = \frac{1}{9} R_a$

Hence $R_b > R_a > R_c$

$\rho_a = \rho_b = \rho_c$ because all the three conductors are of same material.

14. Biogas is a mixture of methane, carbon dioxide, hydrogen, hydrogen sulphide. Following steps are involved in obtaining biogas: 3

     i) Mixing (Slurry of cattle-dung and water)
     ii) Digesting (decomposition of cattle-dung by anaerobic bacteria)
     iii) Formation of biogas
     iv) Residue left after the formation of biogas.

15. Damaging as it is a deadly poison.   3
Beneficial as it shields the surface of the earth from UV radiations of the Sun.
By not using synthetic chemicals like CFCs, that deplete O_3 layer.

OR

- Flow of energy is unidirectional.
- Terrestrial plants take about 1% of the Sun's energy and change it to chemical energy.
- A great deal of energy is -lost as heat/ used for digestion/doing work/growth and reproduction.

- Only 10% of organic matter present at each trophic level (and available to next trophic level).
- Food chains are mainly of 3-4 trophic levels (because of 10% law) .
- The number of producers are maximum (the number reduces in subsequent trophic levels).
- Food webs are more common (as compared to isolated food chains).
- Biological magnification can be observed.   (Any three)

SECTION D

16. a) Diagrams   (activity 3.5 fig. 3.1)   1
            Procedure   1
    Observation - Heat is transferred from one end of metal wire to the free end of wire which melts the wax and pin falls. Shows metals conduct heat.   1

b) Ore   HgS   cinnabar

Roasting	$2HgS (s)$	$+$	$3O_2(g)$	$\rightarrow$	$2HgO(S) + 2SO_2(g)$ 1
Reduction	$2HgO(s)$	$\xrightarrow{\Delta}$	$2Hg(l)$	$+$	$O_2(g)$ 1

17. $2CH_3COOH$ $+$ $2Na$ $\rightarrow$ $2CH_3COONa$ $+$ H_2O
         (A)   (B)

    CH_3COOH + C_2H_5OH $\xrightarrow{\text{Acid}}$ $CH_3COOC_2H_5$ $+ H_2O$ 2
                      (C)   (D)
    $CH_3COOC_2H_5$ $+ NaOH$ $\longrightarrow$ C_2H_5OH $+ CH_3COONa$ 1

    A - CH_3COOH ½
    B - CH_3COONa ½
    C - C_2H_5OH ½
    D - $CH_3COOC_2H_5$ ½

OR

a) Carbon has electronic configuration 2, 4. It could gain four electrons forming C^{-4} anion or lose 4 electrons to form C^{+4} cation . Both are not possible due to energy considerations. Carbon overcomes this problem by sharing electrons and forming covalent compounds.   2
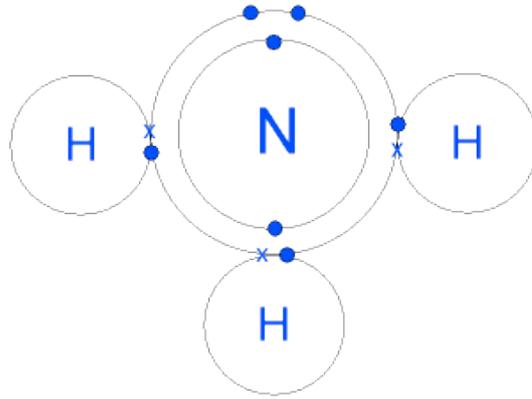
Two reasons for forming large number of compounds: 1
        1) Catenation
        2) Tetra valency

b) Formation of NH_3 molecule   2
            N – 2, 5
            H – 1

Three hydrogen atoms each share their 1 electron with
nitrogen to form three covalent bonds
and make an ammonia molecule (NH_3) ammonia molecule.

18. a) page 137, figure 8.11   5

   Correct diagram with correct labelling, correctly matched with the following parts:-

      i) Fallopian Tube/Oviduct
      ii) Uterus
      iii) Vagina

   b) People prefer use of condoms as it prevents STDs/gives privacy to the user. Condoms help create a mechanical barrier preventing meeting of sperms and ovum.

19. i) Natural selection   5
    ii) Genetic drift
    iii) Law of Dominance
    iv) Acquired characters are not inherited
    v) Gene flow

                                                    OR

a) Body or its parts that are not decomposed/preserved traces of organisms. (to begin with new line)
            • Upon digging the earth, the fossils that are found closer to the surface are more recent than the fossils in deeper layers.
            • By detecting the ratios of different isotopes of the same element in the fossil material.
        [
b)   i) by selecting very short distances between leaves.
          ii) by selecting sterile flowers.

20. (a) Power of accommodation: It is the ability of the eye lens to adjust its focal length. Ciliary muscles of eye are responsible for change in its focal length.   2

 (b)   Myopia
       Causes : i) excessive curvature of the eye lens   3
                  ii) elongation of eyeball
       This defect can be corrected by using a concave lens of suitable power.

        For ray diagram refer NCERT Page 189 figure 11.2 (a), (b) and (c).

21. (i) Refer NCERT Page 233, Activity 13.8   3

(ii)   a) The galvanometer needle deflects momentary in one direction because when the key is closed ,magnetic field lines around coil-2 increases momentary that causes induced current in coil-2.   1

b) The galvanometer needle deflects momentary but in opposite direction because when the key is opened, magnetic field lines around coil-2 decreases momentary that causes induced current in coil-2.   1

OR

Electric generator for principle, diagram, working Refer NCERT page 236, point 13.6.

SECTION E

22. The colour of dilute solution of Sodium hydroxide turns pink or adding Phenolphthalein as NaOH is a base .When excess of HCl is added the final mixture becomes colourless due to neutralisation of base with an acid.   2

OR

Metals in increasing order of reactivity - Copper, iron ,zinc and magnesium

1. Color of the solution changes from blue to green
2. Reddish brown deposits on iron filings

23. a) $NaHCO_3$ (½)

CH$_3$COOH   + NaHCO$_3$ →   CH$_3$COONa   + H$_2$O + CO$_2$ (1)   2

b) CO$_2$ on passing through lime water turns milky.   (½)

24. Yeast   2
Budding – The parent (yeast) cell produces a small protuberance that grows to form a bud. The nucleus of the parent (yeast) cell divides, such that the daughter nucleus moves into the daughter cell and the process continues to form a chain of buds.

OR

In absence of KOH- CO$_2$ released by germinating seeds is not absorbed, partial vacuum is not created in the conical flask, air pressure in the flask is <u>not</u> reduced, water level does not rise in the delivery tube.

25. Soft/ruptured seed coat, radicle which emerges first (add comma) , leafy plumule, between the two cotyledons.   2

26. LC of ammeter = $\frac{0.2}{10}$ A = 0.02 A   2

LC of Voltmeter = $\frac{1}{10}$ = 0.1 V

Current = 15 x 0.02 A = 0.3 A

Potential difference = 21 x 0.1 V = 2.1 V

27. (i) $\angle i = \angle e$.   2
    (ii) Angle of emergence also increases.
    (iii) The light ray falls along the normal or the refractive index of the two optical media are   equal.

OR

(i) Concave mirror   ;   f = 35 - 15 = 20 cm

(ii) Because the incident rays parallel to each other after reflection from concave mirror meets at focus and produce sharp image at focus.