

CLASS: X

TIME: 3 hrs

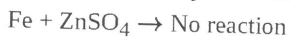
Section A

1.

(c) No reaction

**Explanation:**

No reaction takes place because Fe is less reactive than Zn



2.

(d) Decomposition reaction

**Explanation:**

Ferrous sulphate crystals contain water molecules ( $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ ). On heating, ferrous sulphate crystals lose water and anhydrous ferrous sulphate ( $\text{FeSO}_4$ ) is formed. So their colour changes from light green to white.

On further heating, anhydrous ferrous sulphate decomposes to form ferric oxide ( $\text{Fe}_2\text{O}_3$ ), sulphur dioxide ( $\text{SO}_2$ ) and sulphur trioxide ( $\text{SO}_3$ ). So, the gas emitted smells like burning sulphur.

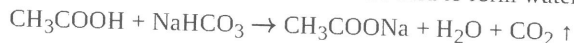
In this reaction, the single reactant  $\text{FeSO}_4$  decomposes to form three different products. So, the reaction is a decomposition reaction.

3.

(d) a gas evolves

**Explanation:**

Sodium bicarbonate reacts with acetic acid to form water, carbon dioxide and sodium acetate. Carbon dioxide gas is evolved.

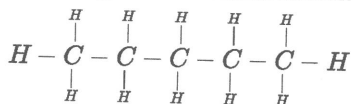


4.

(d) 16 covalent bonds

**Explanation:**

Following is the structural formula of pentane. It shows 16 covalent bonds:



5.

(d) (i) and (iv)

**Explanation:**

Aluminium has good thermal conductivity and high melting point. These properties are useful in the making of utensils. The commonly used metals in making utensils are copper, steel (an alloy of iron) and aluminium.

Copper and aluminium are the most preferred due to their conduction of heat.

6.

(b) A, B and C

**Explanation:**

Carbon is a tetravalent element and does not lose or gain electrons easily to form electrovalent bonds. It forms covalent bonds with other elements.

7. (b) Fluorine  
**Explanation:**  
Fluorine
8. (d) Germinating seeds  
**Explanation:**  
Germinating seeds
9. (a) Tt and Tt  
**Explanation:**  
Tt and Tt
10. (c) (A)  
**Explanation:**  
Yeast cells do not separate after budding because it is only after the formation of a chain of buds get separated.
11. (d) Seven  
**Explanation:**  
Mendel selected 14 different varieties of the pea and grouped them into seven pairs. Each pair was considered for a specific trait (characteristic) such as flower colour or seed shape or stem length, etc. The two members of each pair showed contrasting forms of the chosen trait, e.g., in a pair selected for stem length, one variety had a tall stem (6-7 feet tall) while the other had a dwarf stem.
12. (b) all parts in the peel  
**Explanation:**  
Safranin stains epidermal cells of the onion peel.
13. (b) The field consists of concentric circles centred on the wire  
**Explanation:**  
The field consists of concentric circles centred on the wire. It originates from the circumference of the wire and spread out thus creating concentric circles.
14. (c) Ohm  
**Explanation:**  
Ohm
15. (a) Biological magnification  
**Explanation:**  
The chemicals used to protect crops from diseases and pests are washed down into the soil or the water bodies. From the soil, these are absorbed by the plants along with water and minerals. From the water bodies, these are taken up by aquatic plants and animals. The non-biodegradable chemicals thus enter the food chain. They get accumulated progressively at each trophic level. As human beings occupy the top level in any food chain, the maximum concentration of these chemicals gets accumulated in human bodies. This phenomenon is known as biological magnification.
16. (d) Garden

**Explanation:**

An ecosystem may be classified as a natural ecosystem or a man-made ecosystem. A garden is an example of a man-made ecosystem. Deserts, rivers and grasslands are examples of natural ecosystems.

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

**Explanation:**

A chemical reaction becomes faster at higher temperatures because at high temperature, the movement of particles are greater.

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

**Explanation:**

Both A and R are true and R is the correct explanation of A.

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

**Explanation:**

Both A and R are true and R is the correct explanation of A.

20.

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

**Explanation:**

Both A and R are true but R is not the correct explanation of A.

**Section B**

21. Carbon forms strong bonds with most other elements due to its ability to share electrons in covalent bonds. This property arises from carbon's four valence electrons, allowing it to form multiple bonds and complex structures. The resulting compounds exhibit exceptional stability, contributing to carbon's versatility and prominence in organic chemistry.
22. The DNA in the nucleus of a cell is the information source for making proteins. If the information is changed, different proteins will be made. The basic event in reproduction is the creation of a DNA copy. Cells use chemical reactions to build copies of their DNA. This creates two copies of the DNA in a reproducing cell and they need to get separated from each other. DNA copying is accompanied by the creation of an additional cellular apparatus, and then the DNA copies separate, each with its own cellular apparatus.
23. The swelling of guard cells due to osmosis of water causes opening of stomatal pores while shrinking of guard cells closes the pores. Opening and closing of stomata occurs due to turgor changes in guard cells. When guard cells are turgid, stomatal pore is open while in flaccid conditions, the stomatal aperture closes.

OR

**Root pressure:** The walls of cells of root hairs are very thin. Water from soil enters the root hairs because of osmosis. Root pressure is responsible for movement of water up to the base of the stem. During absorption, water is forced into the xylem vessels by the surrounding cortical cells with a certain force. This induces a pressure which is responsible for ascent of sap to many feet in xylem. This pressure which is developed due to the activity of root is called as root pressure. Root pressure is a vital phenomenon and depends upon the activity of living root cells. The magnitude of root pressure varies from 2-8 atm.

24. Lateral shift depends on the following factors:

- i. It is directly proportional to the thickness of glass slab.
- ii. It is directly proportional to the angle of incidence.
- iii. It is directly proportional to the refractive index of the glass slab.
- iv. It is inversely proportional to the wavelength of the light used.

25. The arrow which represents the smallest amount of energy transferred between organisms is Q and the largest amount of energy lost to ecosystem is R.

OR

X - Primary consumers; Z - Tertiary consumers

26. Accommodation is the distance between near point and far point. The eye is able to adjust its focal length in such a way that it is able to focus any of the objects between near point and far point.

**Section C**

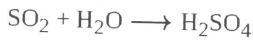
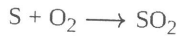
27. (a) With the help of the wires, try to convert the samples in the form of thin wires. Metals will be readily formed into thin wires being ductile whereas non metals being brittle will break. Now if we construct a cell using these wires the circuit which consists of metallic wires conducts electricity and the bulb will glow whereas non-metallic wires will not allow electricity to pass through them. Also, if beaten by a hammer, the metallic samples will produce a loud ringing sound indicating the metals are sonorous.

(b) From these tests we can say :

- (i) Metals are ductile whereas non-metals are not.
- (ii) Metals are good conductors of electricity while non metals are not.
- (iii) Metals are sonorous while non-metals are not.

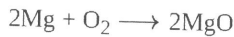
28. i. Sulphur is a non-metal because of the following reason:

- a. It is a poor conductor of electricity.
- b. Sulphur is neither malleable nor ductile.
- c. Sulphur forms acidic oxide.

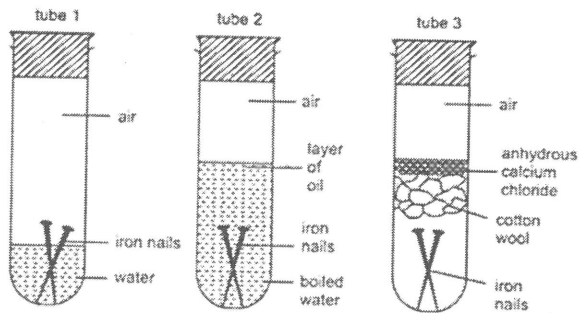


ii. Magnesium is metal because of the following reason.

- a. It is a good conductor of electricity.
- b. Magnesium is malleable nor ductile.
- c. It forms basic oxides



OR



**Test tube 1:** Iron nails would get rusted that is corroded as they are exposed to moisture and air.

**Test tube 2:** Iron nails won't get rusted as they are exposed to water that is devoid of oxygen due to boiling and further the layer of oil is not letting oxygen come into contact with the water in which nails are immersed.

**Test tube 3:** Iron nails won't get rusted or corroded because they are not exposed to moisture and air.

29. Water bath is a must to boil the leaf in ethanol as precaution. A water bath is being used here for heating alcohol because alcohol is a highly inflammable liquid. So, if alcohol is heated directly over a flame, then it will catch fire at once. This boiling alcohol will extract (or remove) chlorophyll from the green leaf.

30. Parents	RRYY	x	rryy
	Round, yellow		wrinkled, green
F <sub>1</sub> —	Rr Yy	x	Rr Yy
	Round, yellow		<b>Round, yellow</b>

The given cross is a dihybrid cross that shows the inheritance of two different traits simultaneously. In the given question, when pure breeding dominant parent plant (RRYY) crossed with pure breeding recessive parent plant (rryy), it gives heterozygous dominant progeny in the F<sub>1</sub> generation. All progeny in this cross will have genotype RrYy and exhibit round yellow. Self-cross of F<sub>1</sub> progeny will give F<sub>2</sub> generation.

31. i. Concave Mirror

ii. It is given, object distance  $u = -20\text{cm}$ , distance  $v = 80\text{cm}$

Magnification is given as  $M = -v/u$

$$M = -v/u = -(-80\text{cm}/-20) = 4$$

iii. Distance between object and image  $v-u = -80\text{cm} - (-20\text{cm}) = -60\text{cm}$

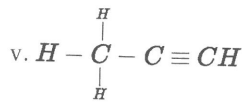
32. i.  $1 + 2 = 3\Omega$  when connected in series

$$\text{current through each resistor } I = \frac{V}{R_s} = \frac{6}{3} = 2A$$

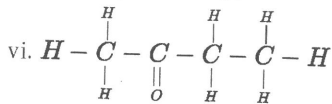
$$\text{Power used in } 2\Omega \text{ resistor } P_1 = I^2R = (2)^2(2) = 8\Omega$$

$$P_1 = 8\Omega = \frac{V}{2} = \frac{4}{2} = 2A$$





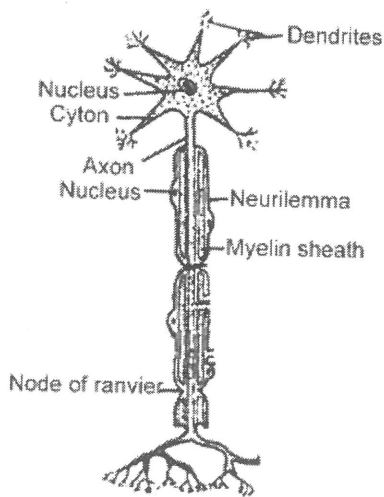
Prop-1-yne or Propyne



Butan-2-one

35. i. A- Bryophyllum - Via Budding type of Vegetative propagation (Asexual reproduction). B- Plasmodium - Multiple fission
- ii. Spore formation benefits are that spore can survive under unfavourable condition because of protective covering. Also, interaction between 2 parents are not needed. And importantly, it is so light weighted that possibility of dispersion by other agents are increased.
- iii. Budding and regeneration.
- Budding is a process in which a bud develops as an outgrowth due to repeated cell divisions at a specific site. This bud develops, gets matured and detaches from the parent cell to become a new individual.
- Regeneration: It takes place as specialised cells divide to form large number of cells, undergo differentiation to become various cell types and tissues.

OR



Functions :

- i. Nerve cells are specialized for conducting information via electrical impulses from one part of the body to another part.
  - ii. Dendrites acquire the information.
  - iii. Axon conducts information as electrical impulse.
  - iv. Terminal arborization pass the information as chemical stimulus at synapse for onward transmission.
36. If  $u$  is the distance of object and  $v$ , the distance of image from optical centre of the lens, then focal length  $f$  is related to  $u$  and  $v$  by  $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$  which is called lens formula. The formula is equally applicable to convex, concave or any other type of lens. (e.g. concavo-convex, plano-convex, convexo-concave, plano-concave etc.)

**Sign Conventions:**

- (1) The object is always placed to the left of the lens.
- (2) All distances parallel to principal axis are measured from optical centre of the lens.
- (3) All distance measured to the right of optical centre (along x-axis) are taken as positive while those measured to the left of optical centre (along x-axis) are taken as negative.
- (4) Distance measured perpendicular to and above the principal axis (along y axis) are taken as positive.
- (5) Distance measure perpendicular to and below the principal axis (y'-axis) are taken as negative.

**Assumptions** (1) Object is taken on principal axis. (2) The lens is thin.

OR

Object height,  $h = +2$  cm

Image height,  $h' = -3$  cm (real image hence inverted)

Object distance,  $u = -16$  cm

Image distance,  $v = ?$

Focal length,  $f = ?$

(i) Position of image

From the expression for magnification

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

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

Putting values, we get  $v = -(-16) \times \frac{-3}{2}$

$$v = -24 \text{ cm}$$

The image is formed at distance of 24 cm in front of the mirror (negative sign means object and image are on the same side).

(ii) Focal length of mirror

Using mirror formula, Putting values, we get

Using mirror formula,

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

Putting values, we get  $\frac{1}{f} = \frac{1}{-16} + \frac{1}{-24}$

$$= -\frac{3+2}{48}$$

$$\text{or } f = -\frac{48}{5}$$

$$= -9.6 \text{ cm}$$

### Section E

37. i. If the crystal is moistened with water, then the blue colour of the crystal reappears.  
ii. The commercial name of calcium sulphate hemihydrate is Plaster of Paris.  
iii. Five water molecules are present in one formula unit of copper sulphate.

**OR**

$\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$  is obtained when gypsum is heated at 373K.

Heating gypsum at 373K results in loss of water of crystallization, forming plaster of Paris as the product.

38. i. In plants, negative phototropism occurs in roots.  
ii. Phototropism in shoots is attributed due to auxin in plants.  
iii. Tendrils exhibit/ twining of tendrils show thigmotropism movement.

**OR**

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,  $\theta$  is angle between velocity and magnetic field.

So,  $\sin\theta$  is maximum when  $\theta$  is  $90^\circ$

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  $90^\circ$