CBSE Class 10 Science

Sample Paper 06 (2020-21)

Maximum Marks: 80

Time Allowed: 3 hours

General Instructions:

i. The question paper comprises four sections A, B, C and D. There are 36 questions in the question paper. All questions are compulsory.
ii. Section–A - question no. 1 to 20 - all questions and parts thereof are of one mark each. These questions contain multiple-choice questions (MCQs), very short answer questions and assertion - reason type questions. Answers to these should be given in one word or one sentence.
iii. Section–B - question no. 21 to 26 are short answer type questions, carrying 2 marks each. Answers to these questions should in the range of 30 to 50 words.
iv. Section–C - question no. 27 to 33 are short answer type questions, carrying 3 marks each. Answers to these questions should in the range of 50 to 80 words.
v. Section–D - question no. 34 to 36 are long answer type questions carrying 5 marks each. Answers to these questions should be in the range of 80 to 120 words.
vi. There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
vii. Wherever necessary, neat and properly labeled diagrams should be drawn.

Section A

1. Give the chemical formula of rust.

OR

Write the formula and then balance the following equation.
Ferrous sulphate + Sodium hydroxide → Ferrous hydroxide + Sodium sulphate

2. We need to balance a skletal chemical equation. Give reason to justify the statement.
3. Which of the following ingredients are not used in making soap?

a. Cotton seed oil, KOH
b. Soyabean oil, $Ca(OH)_2$
c. Castor oil, NaOH
d. Mustard oil, NaOH

4. Write the relation between heat energy produced in a conductor when a potential difference V is applied across its terminals and a current I flows through it for time t.
5. Name two salts that are used in black and white photography.
6. The magnification produced by a plane mirror is +1. What does this mean?

OR

What is magnification of lens ?

7. Define ecosystem.
8. How is induced current in a secondary coil related to current in a primary coil?
9. Why is the tungsten used almost exclusively for filament of electric lamps? Explain.

OR

Why are coils of electric toasters and electric irons made of an alloy rather than a pure metal ?

10. Write two examples sulphide ores.
11. In human alimentary canal, name the site of complete digestion of various components of food.

OR

Name the green dot like structures in some cells observed by a student when a leaf peel was viewed under a microscope. What is this green colour due to?

12. Define chromosome.

OR

Give one word for a pair of genes controlling a pair of contrasting characters.

13. Which chamber of human heart receives deoxygenated blood?
14. **Assertion (A):** The aqueous solution of glucose and alcohol does not show acidic character.

Reason (R): Aqueous solutions of glucose and alcohol do not give H^+ ions.

a. Both A and R are true and R is the correct explanation of the assertion.
b. Both A and R are true and R is the correct explanation of the assertion.
c. A is false but R is true.
d. A is true but R is false.

15. **Assertion:** Wire A is thin in comparison to wire B of same material same length then resistance of wire A is greater than resistance of wire B.

Reason : Resistivity of wire A is greater than resistance of wire B.

a. Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
b. Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.
c. Assertion is CORRECT but, reason is INCORRECT.
d. Assertion is INCORRECT but, reason is CORRECT.

OR

Assertion (A): A compass needle is placed near a current-carrying wire. The deflection of the compass needle decreases when the compass needle is displaced away from the wire.

Reason (R): Strength of a magnetic field decreases as one moves away from a current-carrying conductor.

a. Both A and R are true and R is correct explanation of the assertion.
b. Both A and R are true but R is not the correct explanation of of the assertion
c. A is true but R is false.
d. A is false but R is true.

16. **Assertion (A):** Asexual reproduction is a primitive type of reproduction.

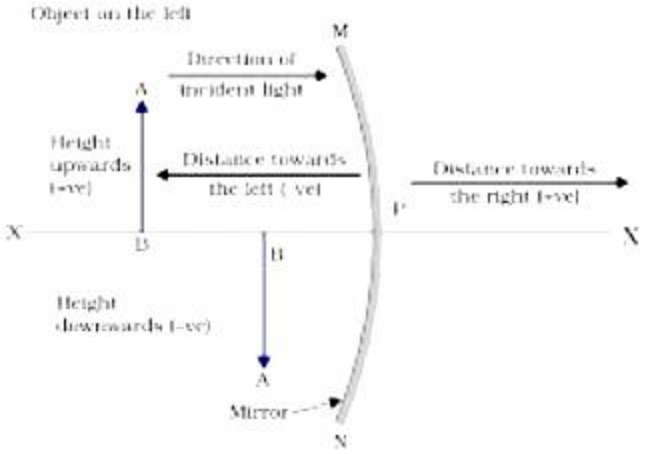
Reason (R): Asexual reproduction involves only mitotic cell division.

a. Both A and R are true and R is correct explanation of the assertion.
b. Both A and R are true but R is not the correct explanation of the assertion
c. A is false but R is true.
d. A is true but R is false.

17. **Read the following and answer any four questions:**

While dealing with the reflection of light by spherical mirror set of sign convention is followed. In this convention, the pole (P) of the mirror is taken as the origin. The object is

placed to the left of the mirror. All distance measured to the right of the origin is taken positively. Distance to the left is measured negative. All distance parallel to the principle is measured from the pole.



i. Linear magnification produced by a concave mirror may be
   a. less than 1 or equal to 1
   b. more than 1 or equal to 1
   c. less than 1, more than 1 or equal to 1
   d. less than 1 or more than 1

ii. Magnification produced by a plane mirror
   a. less than one
   b. greater than one
   c. zero
   d. equal to one

iii. If the magnification of -1 is to be obtained by using a converging mirror, then the object has to be placed
   a. between pole and focus
   b. at the centre of curvature
   c. beyond the centre of curvature
   d. at infinity

iv. The ratio of the height of an image to the height of an object known as
   a. magnification
   b. lateral displacement
   c. refractive index
   d. none of the above

v. If the magnification has a plus sign then the image is _____ and _____.
   a. virtual; erect
   b. real; erect
   c. virtual; inverted
   d. real; inverted

18. **Read the following and answer any four questions:**

Asexual reproduction is very common in unicellular organisms. It is regarded as the simplest type of reproduction e.g. binary fission in Amoeba, budding in hydra, spore formation in Rhizopus, and vegetative propagation in flowering plants like Rose.

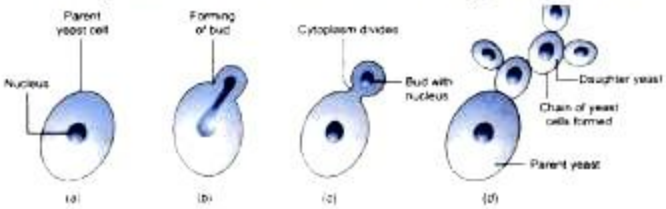
i. Offspring formed by asexual reproduction have greater similarity among themselves because
   A. asexual reproduction involves only a single parent
   B. asexual reproduction does not involve gametes
   C. asexual reproduction occurs before sexual reproduction
   D. asexual reproduction occurs after sexual reproduction
   a. Both A and B are correct
   b. Both A and C are correct
   c. Both B and D are correct
   d. Both C and D are correct

ii. In the list of organisms given below, those that reproduce by the asexual method are
   A. banana
   B. dog
   C. yeast
   D. amoeba
   a. B and D are correct
   b. A and D are correct
   c. A, C and D are correct
   d. B, C and D are correct

iii. Factors responsible for the rapid spread of bread mould on bread slices are
   A. a large number of spores
   B. availability of moisture and nutrients in bread
   C. presence of tubular branched hyphae
   D. formation of round shaped sporangia

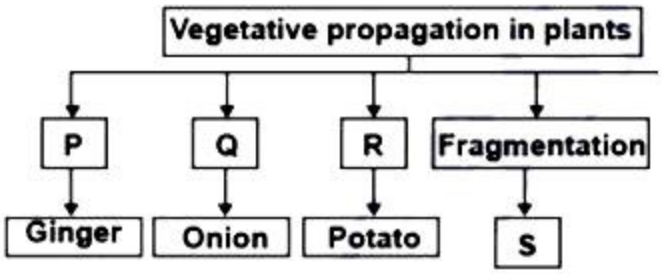
a. A and B only
b. B and D only
c. A and C only
d. C and D only

iv. Identify the mode of asexual reproduction.



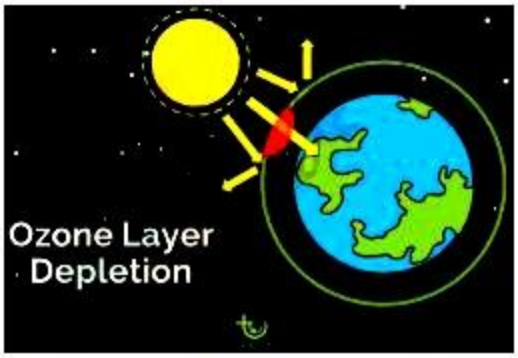
a. Binary fission
b. Fragmentation
c. Spore formation
d. Budding

v. Identify P, Q, R, S.



a. Rhizome, bulb, tuber, spirogyra
b. Bulb, Spirograph, tuber, rhizome
c. Spirograph, tuber, bulb, rhizome
d. Rhizome, Spirograph, bulb, tuber

19. **Read the following and answer any four questions:**



Ozone is a molecule formed by 3 atoms of oxygen. Ozone is a deadly poison at a higher level of atmosphere. Ozone performs as an essential function. It shields the surface of the earth. The amount of ozone in the atmosphere began to drop sharply in the 1980s. Thus

decrease has been likely due to the synthetic chemical.

i. Which radiation is absorbed by the ozone layer?
   a. UV rays
   b. X-rays
   c. Gamma rays
   d. Visible light

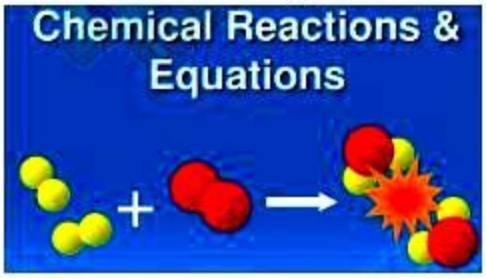
ii. Which of the following is a prime health risk associated with greater UV radiation through the atmosphere due to the depletion of the ozone layer?
   a. Damage to the digestive system
   b. Increased liver cancer
   c. Increased skin cancer
   d. Neurological disorders

iii. Which product contains an ozone-depleting substance?
   a. Oven
   b. Refrigerator
   c. Car with AC
   d. All of these

iv. O_2 is converted into O_3 by the action of:
   a. infra-red radiation
   b. UV radiation
   c. gamma radiation
   d. cosmic radiation

v. The ozone depletion in the upper atmosphere is mainly due to emissions of:
   a. unburnt hydrocarbons
   b. CFC
   c. greenhouse gases
   d. UV radiation

20. **Read the following and answer any four questions:**



A schematic representation of any chemical reaction with the help of symbols and formulas of various species is called a chemical equation. A chemical equation should include all the information regarding the reaction-it should represent a true chemical change, it should be balanced, it should be molecular and it should represent the change in temperature.

i. Select the combination reaction
   a. $2H_2 + O_2 \longrightarrow 2H_2O$
   b. $C + O_2 \longrightarrow CO_2$
   c. $Ca + H_2O \longrightarrow Ca(OH)_2$
   d. All of these

ii. Which of the following is not a thermal decomposition reaction?
   a. $CaCO_3 \longrightarrow CaO + CO_2$
   b. $2FeSO_4 \longrightarrow Fe_2O_3 + SO_2 + SO_3$
   c. $Pb(NO_3)_2 \longrightarrow 2PbO + 4NO_2 + O_2$
   d. $NaCl(aq) \longrightarrow Na^+ + Cl^-$

iii. The formation of polythene from ethane is an example of
   a. Neutralisation reaction
   b. Polymerisation reaction
   c. Displacement reaction
   d. Decomposition reaction

iv. Which of the following elements undergoes corrosion?
   a. Gold
   b. Silver
   c. Platinum
   d. All of these

v. The chemical reaction which produces heat is
   a. endothermic reaction
   b. photochemical reaction
   c. exothermic reaction
   d. oxidation reaction

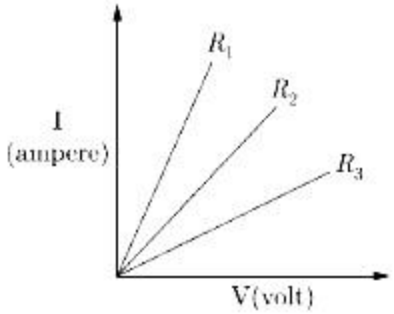
Section B

21. Explain the role of mouth in digestion of food.

OR

Why are white blood corpuscles called soldiers of the body?

22. What is placenta? Describe its structure. State its functions in case of pregnant human female.
23. Write the general formula of aldehyde and ketones.
24. What happens when a cold and concentrated solution of sodium chloride reacts with ammonia and carbon dioxide? Write the equation of the reaction which takes place.
25. Differentiate between virtual image formed by a concave mirror and of a convex mirror.
26. A graph is plotted between the potential difference and the current showing different resistance as follows:



i. What is the order of resistance between R_1, R_2, and R_3.

ii. If a length of a wire is doubled then by what factor does resistance change?

iii. What is the SI unit of resistivity?

27. Explain Mendel's observation when he crossed a homozygous tall (TT) plant with homozygous dwarf (tt) plant followed by self-cross.

OR

In Mendel's experiment of inheritance in which he took two contrasting characters, i.e. round green and wrinkled yellow seeds,

i. What was the phenotype of offsprings in F_1 - generation?

ii. What was the ratio of offsprings in F_2 - generation?

28. a. State ohm's law?

b. The value of (I) current following through a conductor for the corresponding values of (V) potential difference are given below

I (Ampere)	0.5	1.0	1.5	2.5	3
V (Volt)	1	2	3	4.5	5

Plot a graph between V and I and also calculate the resistance.

29. Why is less energy produced during anaerobic respiration than in aerobic respiration?
30. Identify the substance oxidized and substance reduced in the following reaction.
    Write the ionic equation for the substance oxidized and reduced.
    $H_2(g) + CuO(s) \rightarrow Cu(s) + H_2O\ (l)$
31. Why does the reactivity of non-metals decreases down a group?
32. a. What was the basis of Mandeleev's classification of elements?
    b. List two achievements of Mandeleev's periodic tables.
    c. List any two observations which posed a challenge to Mandeleev's periodic law.
33. Carbon can reduce copper oxide to copper but not CaO to Ca. Why?
34. Define nutrition. What are the different modes of nutrition?

OR

Describe the structure of human urinary system.

35. Describe Newton's disc experiment to show that white light is composed of seven spectrum colours.
    Why seven colours combine to give almost white but not perfectly white ?
36. Draw an appropriate schematic diagram showing common domestic circuits and discuss the importance of fuse. Why is it that a burnt out fuse should be replaced by another fuse of identical rating?

OR

Describe the activity that shows that a current-carrying conductor experiences a force perpendicular to its length and the external magnetic field. How does Fleming's left-hand rule help us to find the direction of the force acting on the current-carrying conductor?

CBSE Class 10 Science

Sample Paper 06 (2020-21)

Solution

Section A

1. Iron when reacted with both water and oxygen which present in air (moist air), corrodes. Its silvery colour changes to a reddish-brown, because hydrated oxides are formed which is commonly called as rust.The chemical formula of rust is $Fe_2O_3.xH_2O$ (Hydrated ferric oxide).

   OR

Ferrous sulphate	+	Sodium hydroxide	→	Ferrous hydroxide	+	Sodium sulphate
$FeSO_4$	+	2NaOH	→	$Fe(OH)_2$	+	Na_2SO_4

2. Skeltal chemical equation are unbalanced. We need to balance chemical equation because of law of conservation of mass. It states that 'matter can neither be created nor be destroyed'. Therefore chemical equation must be balanced in each and every chemical reaction.
3. (b) Soyabean oil, $Ca(OH)_2$

   Explanation: Soap is made by heating animal oil or vegetable oil with a concentrated sodium hydroxide solution. Castor oil and NaOH are the ingredients for making soap. Similarly, cottonseed oil and KOH, and mustard oil and NaOH are also the ingredients for making soap.
4. The relation is given by H = VIt.
   Here H = Heat produced, V = Potential difference, I = Current produced and t=time.
5. Two salts that are used in black and white photography are silver chloride ($AgCl$) and silver bromide ($AgBr$).
   Silver chloride decomposes to form silver metal and chlorine gas when exposed to light. The white colour of silver chloride changes to greyish white due to the formation of silver metal.
   $2AgCl\ (s) \rightarrow 2Ag\ (s) + Cl_2\ (g)$

   Silver bromide also behaves in a similar fashion. The pale yellow colour of silver bromide

changes to greyish white due to the formation of silver metal.

$2AgBr\ (s) \rightarrow 2Ag\ (s) + Br_2\ (g)$

6. It means that image produced by plane mirror is erect and of the same size as of the object. Image is virtual.

OR

Magnification of a lens is to the ratio of the height of the image formed by lens to the actual height of object.

If h is the height of the object and h' the height of the image formed by lens, then magnification $m = \frac{h'}{h}$

If u and v are the distances of object and image

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

7. Ecosystem is defined as the structural, functional and self-sustaining unit of biosphere, which consists of biotic and abiotic components.
8. When current in primary coil changes, then a current is induced in the secondary coil.
9. For filament of electric lamp we require a strong metal with high melting point. Tungsten is used exclusively for filament of electric lamps because its melting point is extremely high (3410^oC)

OR

Because the resistivity of an alloy is higher than the pure metal.

10. There are two Sulphide ores:
    1. ,li> (i) Copper glance (Cu_2S)

       (ii) Cinnabar (HgS)
11. Complete digestion of various components of food takes place in the small intestine where pancreas, liver and intestine all secretes various juices containig enzymes which lead to final complete digestion of food.

OR

The green dot-like structure is some cells observed by a student when a leaf peel is viewed under a microscope are chloroplasts. The green colour is due to the presence of green pigment, chlorophyll.

12. Chromosome bearing genes are thread-like structures enclosed within a nucleus. Chromosome is composed of DNA and proteins.

OR

Allele.(present on a specific location on the particular chromosome).

13. The right atrium receives deoxygenated blood from systemic circulation and the left atrium receives oxygenated blood from pulmonary circulation.
14. (a) Both A and R are true and R is the correct explanation of the assertion.
15. (c) Assertion is CORRECT but, reason is INCORRECT.

OR

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

16. (a) Both A and R are true and R is correct explanation of the assertion.
17. i. (c) less than 1, more than 1 or equal to 1
    ii. (d) equal to one
    iii. (b) at the centre of curvature
    iv. (a) magnification
    v. (a) virtual; erect
18. i. (a) Both A and B
    ii. (c) A, C, and D
    iii. (a) A and B
    iv. (d) Budding
    v. (a) Rhizome, bulb, tuber, spirogyra
19. i. (a) UV rays
    ii. (c) Increase skin cancer
    iii. (d) All of these
    iv. (b) UV radiation
    v. (b) CFC
20. i. (d) All of these
    ii. (d) $NaCl(aq) \longrightarrow Na^{+} + Cl^{-}$
    iii. (b) Polymerisation reaction
    iv. (b) Silver
    v. (c) exothermic reaction

Section B

21. The role of the mouth in the process of digestion of the food is
    i. Ingestion of food
    ii. Breakage of food by Mastication
    iii. Saliva aids easy swallowing of food
    iv. Salivary amylase breaks starch into simpler carbohydrates.

OR

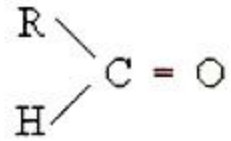
White blood corpuscles engulf (phagocytose) the foreign matter (bacteria, dust and other foreign material) entering the body and act as a line of defense. Hence, WBC's called soldiers. They produce antibodies against antigens, and antitoxins against toxins.

22. Placenta is a special organ that develops temporarily in pregnant female and helps the human embryo in obtaining nutrition from mother's blood via umblical cord.
    Placenta is a disc-like structure embedded in the uterine wall.
    i. It contains hair like projections known as villi on the side of the embryo.
    ii. It contains blood spaces, on mother's side, which surround the villi.

    Functions

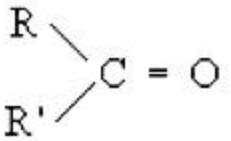
    i. It provides a large surface area for glucose and O_2 to pass from mother's blood to the embryo.
    ii. It also removes metabolic wastes from the embryo.
    iii. It produces important hormone hCG (human chorionic gonadotropin).
    iv. It helps in thermoregulation of foetus.

23. Aldehyde:



R may be H

Ketones:



R and R' may be same or different alkyl groups.

24. When a cold and concentrated solution of sodium chloride (brine) reacts with ammonia and carbon dioxide, sodium hydrogen carbonate and ammonium chloride are formed. Sodium hydrogen carbonate is only slightly soluble in water; it precipitates out as a solid.

$$NaCl + NH_3 + H_2O + CO_2 \rightarrow \underset{\textit{Baking soda}}{NaHCO_3} + NH_4Cl$$

25. The virtual image formed by a concave mirror is always magnified whereas the virtual image formed by a convex mirror is diminished.

26. i. R3 > R2 = R1.

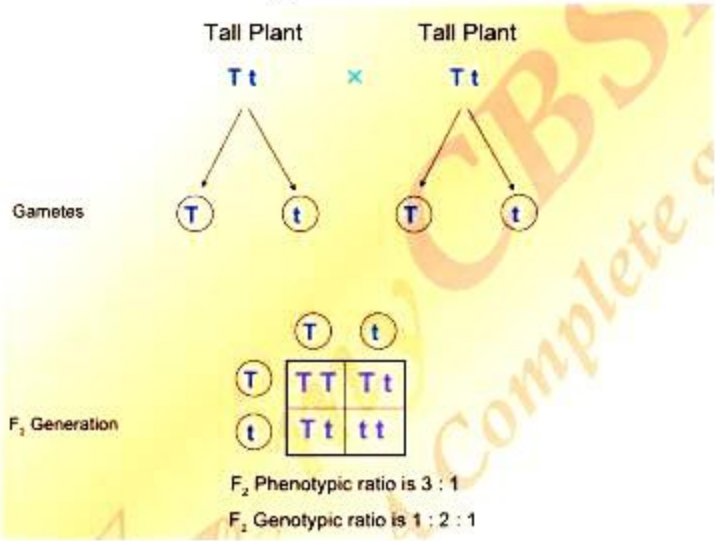
    ii. If a length of a wire is doubled then the resistance becomes half.

    iii. The SI unit of resistivity is ohm-meter.

27. When Mendel crossed a homozygous tall (TT) plant with homozygous dwarf (tt) plant, all plants in F_1 generation were tall (Tt).

    Self crossing of F_1 gives F_2. F_2 generation had 3 tall : 1 recessive plants.

    Since presence of dwarf allele was masked by tall allele in F_1, tall allele (T) was dominant over dwarf allele (t).



OR

i. All offsprings were round yellow in F_1 - generation

ii. Round yellow - 9

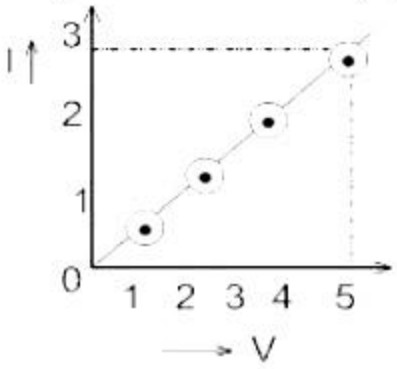
Round green - 3

Wrinkled yellow - 3

Wrinkled green - 1

Therefore, the ratio of offsprings in F_2-generation is $9 : 3 : 3 : 1$.

28. a. At constant temperature the electric current flowing through a conductor is directly proportional to the potential difference across the ends of a conductor provided the temperature and other physical conditions of the conductor remain the constant.



b. Along x-axis 1 V=1 cm

Y-axis 1 A=1 cm

$R = \frac{1}{Slope of curve OA}$

$= \frac{OB}{AB}$

$R = \frac{5}{3}$

$= 1.67\ \Omega$

29. Less energy is produced during anaerobic respiration than in aerobic respiration. There are two reasons:

1. a) The end products of anaerobic respiration can be further oxidized to release energy.

   b) The regeneration of NADP does not yield ATP, as the electrons are not transported to oxygen.

30. $H_2(g) + CuO(s) \rightarrow Cu(s) + H_2O\ (l)$

In this reaction, oxygen is removed from copper and oxygen is added to hydrogen. So, cupric oxide is reduced to copper and hydrogen is oxidized to water. Cupric oxide is oxidizing agent and hydrogen is reducing agent.

31. In a group, containing non-metals, the reactivity decreases down the group. For example, in the halogens present in group 17, the first member fluorine (F) is the maximum reactive while iodine (I) is the least reactive in nature.

Explanation: In non-metals, the atoms of the elements have tendency to gain electrons and not to lose electrons. By gaining electrons, the atoms achieve a noble gas configuration or stable electronic configuration. As we move down the group, the atomic

size increases. Therefore, the nucleus of the atom experiences less attraction towards the nucleus. In other words, the electrons accepting tendency of the element decreases down the group. The reactivity of the elements also decreases down the group.

32. a. The basis of mandeleev's classification of elements was atomic mass.
    b. Achievements:
        i. He classified all the 63 elements known at that time.
        ii. He left some gaps for the elements that were yet to be discovered.
        iii. He names the future elements by prefixing a sanskrit numeral eka (one) to the name of preceding element in the same group.
    c. Observations which posed a challenge are
        i. Position of isotopes
        ii. Irregular increase in atomic masses
        iii. Position of hydrogen.
33. C is a strong reducing agent and can reduce CuO as follows:

    $CuO + C \rightarrow Cu + CO\uparrow$

    Ca is much more reactive than Cu and has greater affinity for oxygen than C has. So, it cannot reduce CaO to Ca.
34. **Nutrition:** The sum total of processes by which living organisms obtain food materials and prepare them for use in the growth, repair and providing energy is termed nutrition. Nutrition is of two types: 1) Autotrophic nutrition, 2) Heterotrophic nutrition.

    1) Autotrophic nutrition: The mode of nutrition in which an organism prepares its own food is called autotrophic nutrition. Mostly green plants have the ability to manufacture their own organic food due to the presence of chlorophyll. They take up CO_2 and H_2O and manufacture carbohydrates in the presence of sunlight process called as photosynthesis. Such organisms are called autotrophs and their mode of nutrition is called autotrophic.

    2) Heterotrophic nutrition: The mode of nutrition in which an organism takes food from another organism is called heterotrophic nutrition. In this type of nutrition, the animals derive organic food materials by consuming bodies or products of other living or dead plants or animals.

OR

The urinary system consists of the following:

1) Kidneys

2) Ureters

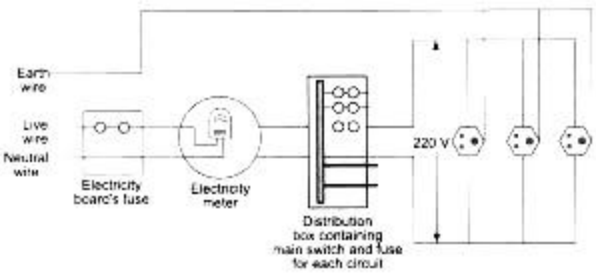
3) Urinary bladder

4) Urethra

1. **Kidneys**: The kidneys are a pair of bean shaped delicate organs. They are situated one on each side of the middorsal line of the abdominal cavity, just below the level of the stomach.
2. **Ureters:** They are two tubes about 30 cm long, emerging from each kidney with the pelvis of which they are continuous. The ureters run downwards and inwards and open into the urinary bladder.
3. **Urinary bladder:** It serves as a reservoir for the urine. It is a hollow muscular organ lined by stratified epithelium. Its average capacity for storages is about 500 mm. It is situated in the cavity of the pelvis just behind the pubic symphysis.
4. **Urethra**: The urethra in two sexes differ. The male urethra is about 20 cm in length. The female urethra is a short duct of about 4 cm long and its extends from the urinary bladder to the external urethra orifice which is in the vestibule just above and anterior to the vaginal orifice.

35. Newton's colour disc: White light consists of seven colours. This can easily be proved byNewton's colour disc. A circular disc of cardboard is painted with coloured radial bands. Order of these colours and their relative widths are the same as in the spectrum of sunlight. On rotating disc rapidly about its centre, all the colours blend and a sensation of almost white light is produced on the retina due to persistence of vision.

Since we have used pigment colours instead of spectrum colours, the disc will not appear pure white but will give a dull appearance. Pigment colours are not pure colours and hence due to impurities, the appearance of the disc is grayish instead of perfectly white.

36. 

A fuse in a circuit prevents damage to the appliances and the circuit due to overloading. Otherwise, the appliances or the circuit may be damaged.

When current in the circuit exceeds the value of fuse rating, the fuse wire burns due to overloading. This causes a gap in the circuit and the current stops flowing in the circuit. This is done due to the reason so that the circuit or the appliances to be connected in the circuit continue functioning without any damage in future.

OR

The activity to demonstrate that a current-carrying conductor experiences a force perpendicular to its length and the external magnetic field can be explained as follows:

Activity: To show the effect of magnetic field on a current-carrying conductor

Materials Required: For this, we need to take a small aluminum rod, a horseshoe magnet, battery, plug key, wires, and a stand.

i. Suspend an aluminum rod horizontally from the stand and two wires at the ends of it are tied. The wires are connected to a Rheostat, battery and a key so that a circuit is completed,
ii. Place a horseshoe magnet in such a manner that the aluminum rod is between the poles of a magnet.

Assume that the above the aluminum rod is South pole of the magnet and below, the north pole of the magnet. Insert the plug key and current is supplied to the rod.

Observation: the aluminum rod is deflected towards the left direction

On changing the direction of the current, the rod is deflection in the right direction.

Hence, it demonstrates that a current-carrying conductor experiences a force perpendicular to its length and the external magnetic field

The direction of the magnetic field can find out with the help of Fleming's left-hand rule. Let current is moving in an anticlockwise direction, then the direction of the magnetic field will be in clockwise direction i.e. at the top of the loop whereas vice-versa in case of the clockwise direction of the current.