

for the chapter.

TEXT BOOK ANSWERS

Objective Type Questions

1. Name the following:

- (a) Natural - Turmeric and Synthetic - phenolphthalein
- (b) Litmus and Phenolphthalein
- (c) Blue litmus; Red litmus
- (d) Vanilla extract
- (e) Strong acids: Hydrochloric acid, Sulphuric acid.
Weak acids: Acetic acid and Formic acid

(f) Strong bases: Sodium hydroxide, Potassium hydroxide.
Weak bases: Calcium hydroxide and Ammonium hydroxide.

(g) Formic acid

(h) Neutralisation reaction

(i) Sodium chloride

2. Fill in the following blanks with suitable words:

(a) acidic (b) indicator (c) neutralisation (d) salt, water
(e) indicators

3. State whether the following statements are true or false:

(a) False (b) False (c) False (d) True

Subjective Type Questions

Short Answer Type Questions

1. An indicator is a substance that changes colour to show whether a solution is acidic or basic. Three common indicators are litmus, phenolphthalein and methyl orange.
2. The yellow curry stain on a white shirt turns red when soap is scrubbed on it because the soap solution is basic in nature and changes the colour of turmeric in the stain to red.

3.

Acidic	Basic	Neutral
Vinegar	Lime water	Sodium chloride
Stomach juices	Toothpaste	Sodium sulphate
Lemon juice	Sodium carbonate	
Ammonium chloride	Baking soda solution	
Ammonium sulphate	Milk of magnesia	
	Ammonia solution	

4. A salt is a neutral chemical compound formed from the reaction between an acid and a base. Two examples of salts are sodium chloride and ammonium chloride.
5. The test tube feels hot because a neutralisation reaction between an acid and a base is an exothermic process, i.e., it releases energy in the form of heat.
6. Calamine solution is applied because an ant bite injects formic acid into the skin, and calamine, which contains zinc carbonate, acts as a mild base to neutralise the acid and relieve the stinging pain.
7. When red litmus turns blue in solution A, it shows that A is basic. Turmeric turning red in solution B also indicates that B is basic. Since red rose extract turns green in solution C, it confirms that C is basic; therefore, all three solutions are basic in nature. The correct option is d.

8. Differences between acids and bases

Acids	Bases
Acids have a sour taste.	Bases have a bitter taste.
Acids turn blue litmus red	Bases turn red litmus blue
Acids are not soapy to touch.	Bases feel soapy to touch.

9. Distilled water is neutral, i.e., it is neither acidic nor basic. This can be verified by using the litmus test: dip both blue and red litmus paper into distilled water and observe that neither changes colour, confirming its neutral nature.

Long Answer Type Questions

1. Salts can be of three types: (i) Neutral salts, (ii) Acidic salts, and (iii) Basic salts.

(i) Neutral salts: Those salts which form a neutral solution on dissolving in water are called neutral salts. The salts formed by the neutralisation of a strong acid by a strong base are neutral. The two examples of neutral salts are sodium chloride (NaCl) and sodium sulphate (Na_2SO_4).

(ii) Acidic salts: Those salts which form an acidic solution on dissolving in water are called acidic salts. The salts formed by the neutralisation of a strong acid with a weak base are acidic. The two examples of acidic salts are ammonium chloride (NH_4Cl) and ammonium sulphate ($(\text{NH}_4)_2\text{SO}_4$).

(iii) Basic salts: Those salts which form basic solutions on dissolving in water are called basic salts. The salts formed by the neutralisation of weak acids with strong bases are basic. The two examples of basic salts are sodium carbonate (Na_2CO_3) and sodium hydrogencarbonate (NaHCO_3).

2. Natural indicators are prepared by extracting the coloured pigments from plant materials that change colour when they come in contact with an acidic or a basic substance.

General Steps for Preparing a Natural Indicator:

- Collect some petals of fallen red rose flower petals and wash them thoroughly with water.
- Crush the petals with mortar and pestle and place them in a beaker. Add some warm water.
- Keep the red rose petals immersed in water for some time till water in the beaker acquires a light red colour.
- Remove the petals by filtration. The light red solution thus obtained is the red rose indicator.

This red rose indicator can now be used for testing acids and bases.

3. (a) Since Manya is blindfolded, she cannot rely on colour changes to identify acids or bases. Therefore, she should use an indicator that gives a sensory (non-visual) change — for example, olfactory indicators like onion extract or vanilla essence. These indicators change or lose their smell in acidic or basic solutions. For instance, the onion smell disappears in a basic solution but remains in an acidic one, allowing Manya to test them by smell.

(b) The red rose extract turns green in liquid X, which means liquid X is basic in nature. When excess amla juice (which is acidic) is added to it, the acid will neutralise the base, and the colour will change back from green to reddish, indicating the solution has become less basic or acidic.

4. (a) Neutralisation is the chemical reaction in which an acid reacts with a base to form a salt and water. We will discuss neutralisation reaction between sodium hydroxide and hydrochloric acid. Take sodium hydroxide solution (base) in a dropper. Add this sodium hydroxide solution to hydrochloric acid in the test tube drop wise (stirring the test tube gently after each addition). Continue to add sodium hydroxide solution drop by drop (while stirring) till a light pink colour just appears in the solution in the test tube [see Figure 9(b)]. We then stop adding more of sodium hydroxide solution.

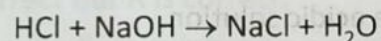
At this stage, all the hydrochloric acid taken in the test tube has been completely neutralised by sodium hydroxide base. Thus, a neutralisation reaction has taken place in the test tube. The completion of neutralisation reaction is indicated by the fact that when all the acid has been neutralised, then a little excess of the base changes the colour of phenolphthalein indicator to pink. This makes the solution in the test tube light pink.

(b) The neutralisation reaction between sodium hydroxide and hydrochloric acid is written as follows:

Word Equation:

Sodium Hydroxide + Hydrochloric Acid $\rightarrow$ Sodium Chloride + Water

Chemical Equation:



Multiple Choice Questions (MCQ)

- | | |
|---------------------------|------------------------------|
| 1. (d) carbonic acid | 2. (a) baking soda |
| 3. (d) have a sour taste | 4. (c) hydrochloric acid |
| 5. (d) sour milk | 6. (c) turmeric |
| 7. (b) acetic acid | 8. (b) baking soda |
| 9. (b) red rose indicator | 10. (b) vinegar |
| 11. (b) B and C | 12. (c) common salt solution |
| 13. (b) ammonium chloride | 14. (c) carbonic acid |
| 15. (c) vinegar | |

TEXT BOOK ANSWERS

Objective Type Questions

1. Name the following:

- (a) Desirable changes
- (c) Rust (Hydrated iron oxide)
- (e) Rusting of iron

- (b) Carbon dioxide (CO_2)
- (d) Pasteurisation

2. Fill in the following blanks with suitable words:

- (a) rusting, chemical
- (c) physical, reversed
- (e) combustible
- (g) Erosion

- (b) physical, chemical
- (d) magnesium oxide, basic, chemical
- (f) ignition

3. State whether the following statements are true or false:

- (a) False
- (f) False

- (b) False
- (g) False

- (c) True
- (h) True

- (d) False

- (e) True

Subjective Type Questions

Short Answer Type Questions

- (a) Photosynthesis: Chemical change
(b) Burning of coal: Chemical change
(c) Digestion of food: Chemical change
(d) Dissolving sugar in water: Physical change
(e) Melting of wax: Physical change
(f) Beating aluminium to make aluminium foil: Physical change

- Combustible substances:** These are substances that burn in air (or oxygen) to produce heat and light.

Examples: Wood, paper, kerosene, coal, LPG, and petrol.

Non-combustible substances: These are substances that do not burn in air and cannot produce heat and light on heating.

Examples: Sand, water, glass, iron, and stone.

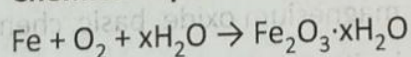
- If we cover a burning candle with a glass jar, the flame then goes out after some time because there is no air left inside the jar. This shows that air (oxygen) is necessary for the burning or combustion.
- Dry leaves catch fire easily because they have low moisture content and a low ignition temperature, so they heat up quickly and start the burning process easily.
- Differences between Physical and Chemical Changes:

Physical Change	Chemical Change
1. No new substance is formed.	1. A new substance is formed.
2. A physical change is a temporary change.	2. A chemical change is a permanent change.
3. A physical change is easily reversible.	3. A chemical change is usually irreversible.
4. Very little energy (in the form of heat, etc.) is absorbed or given out in a physical change.	4. A lot of energy (in the form of heat, light, sound, etc.) is absorbed or given out in a chemical change.

- Word equation**

Iron + Oxygen + Water $\rightarrow$ Hydrated Iron (III) oxide (Rust)

Chemical equation



- The reaction between baking soda (sodium hydrogen carbonate) and vinegar (acetic acid) is a chemical change because new substances are formed as carbon dioxide gas, water, and sodium acetate. This change cannot be reversed, and bubbles of carbon dioxide show that a new substance has been produced.

8. Reversible and Irreversible Change

Change	Reversible / Irreversible	Reason
(a) Stitching cloth to a shirt	Irreversible	The cloth cannot be brought back to its original form.
(b) Twisting of straight string	Reversible	The string can be untwisted.
(c) Making idlis from a batter	Irreversible	New substance is formed after cooking.
(d) Dissolving sugar in water	Reversible	Sugar can be recovered by evaporation.
(e) Drawing water from a well	Reversible	Water can be poured back into the well.
(f) Ripening of fruits	Irreversible	A ripe fruit cannot turn back into an unripe one.
(g) Boiling water in an open pan	Reversible	Vapour can condense back into water.
(h) Rolling up a mat	Reversible	The mat can be unrolled.
(i) Grinding wheat grains to flour	Irreversible	The flour cannot be changed back into grains.
(j) Forming of soil from rocks	Irreversible	Rocks cannot be reformed from soil.

9. (a) (i) Melting of wax: It is a physical change because only the state of wax changes from solid to liquid, and no new substance is formed.
 (ii) Burning of wax: It is a chemical change because new substances like carbon dioxide and water vapour are formed.
- (b) (i) Rolling of roti from dough: It is a physical change as only the shape changes.
 (ii) Baking of roti: It is a chemical change because new substances with a different taste is formed on heating.
- (c) (i) Inflating a balloon: It is a physical change because the balloon only changes in size and shape.
 (ii) Bursting an inflated balloon: It is an irreversible physical change since the balloon cannot be restored to its original form.

Long Answer Type Questions

1. (a) Physical change: A physical change is a change in which only the physical properties of a substance, such as shape, size, or state change, but no new substance is formed. These changes are usually reversible.
 Examples: (i) Melting of ice into water. (ii) Dissolving salt in water
- (b) Chemical change: A chemical change is a change in which a new substance with different properties is formed. These changes are usually irreversible and involve changes in composition and energy.
 Examples: (i) Burning of paper. (ii) Rusting of iron
2. Natural changes are those changes that occur on their own in nature without any human involvement. These changes take place due to natural factors such as sunlight, air, temperature, or seasonal effects.

Examples

1. **Ripening of fruits:** Fruits naturally become ripe after some time.
2. **Change of seasons:** Summer, winter, and rainy seasons occur naturally.
3. **Growth of plants:** Plants grow on their own with the help of sunlight, water, and air.
4. **Rusting of iron:** Iron objects kept in moist air rust naturally over time.
3. The formation of soil from rocks is a physical change. In this process, rocks break down into smaller pieces due to natural factors like wind, rain, and temperature changes. The composition of the rock remains the same, only its size and shape change. Hence, it is a physical change.
4. No, the changes in the cement cannot be reversed. When the bag of cement gets wet, the cement reacts chemically with water to form a hard solid mass. This reaction is irreversible, and the cement cannot be changed back into its original dry powder form.
5. When a candle burns, both physical and chemical changes occur:
 - Physical change: The melting of wax near the flame is a physical change because the wax only changes its state from solid to liquid, and no new substance is formed.
 - Chemical change: The burning of wax vapour is a chemical change because new substances like carbon dioxide, water vapour, and heat are produced.

Multiple Choice Questions (MCQ)

1. (c) A and D
2. (a) A and B
3. (a) water changing into ice
4. (c) cooking a pot of rice
5. (d) permanent change
6. (b) charcoal burns
7. (c) asbestos
8. (c) making curd from milk
9. (d) Both A and B are chemical changes
10. (b) B and C
11. (d) B and D
12. (c) A and C

TEXT BOOK ANSWERS

Objective Type Questions

1. Name the following:

- (a) Sun
- (b) Natural sources: Sun, stars; Man-made sources: Electric bulb, candle
- (c) Transparent material
- (d) Translucent screen
- (e) Periscope

2. Fill in the following blanks with suitable words:

- (a) straight
- (b) light
- (c) see
- (d) kaleidoscope
- (e) opaque

3. State whether the following statements are true or false:

- (a) False
- (b) True
- (c) True
- (d) False
- (e) False
- (f) False
- (g) True

4. Match the items in Column A with those in Column B:

- (a) (iii)
- (b) (i)
- (c) (iv)
- (d) (ii)

Subjective Type Questions

Short Answer Type Questions

1. The sources of light are: Sun, Star, Electric bulb, Meteor, Firefly.
2. The luminous objects from the list are the Sun and the Pole Star.

3. We can see an electric bulb at night when it's 'on' because it becomes a luminous object, which converts the electrical energy into light energy that travels to our eyes.
4. **Transparent:** Clear glass, Water, Air

Translucent: Tracing paper, Ground-glass

Opaque: Cardboard, Brick wall, Aluminium sheet

5. Two main differences are that a pinhole camera image is a real, inverted, and often coloured picture with details, while a shadow is a black, two-dimensional outline that lacks colour and detail.
6. We are able to see the moon because it reflects sunlight; the moon does not produce its own light. Light from the sun falls on the moon, and this reflected light travels to our eyes, allowing us to see the moon.
7. A periscope is an optical instrument used to see over or around obstacles, which consists of a tube with two plane mirrors placed at 45-degree angles to each other. Therefore, a simple periscope contains two plane mirrors that reflect light to allow an observer to see objects that are not in their direct line of sight.
8. Images formed in a pinhole camera are real, inverted, and can vary in size (smaller, same, or larger) depending on the object's distance from the camera. The image is a true-colour representation of the object and is always upside down and reversed.
9. To observe a shadow, we need a light source, an opaque object to block the light, and a screen or surface for the shadow to fall on. These three components work together to create the dark area that is the shadow.
10. A bird high in the sky does not cast a visible shadow because the sun's light rays are spread out over a vast distance, and the bird is far from the ground. This results in a very large and faint shadow that is too diffuse to be seen. When the bird is close to the ground, its shadow becomes smaller, darker, and more distinct because it is cast at a shorter distance from the ground screen.
11. An infinite image will be formed. This happens because each mirror reflects the image formed by the other mirror repeatedly, producing a series of images extending endlessly.
12. The number of images formed when an object is placed between two plane mirrors inclined at an angle θ is given by the formula:

$$\text{Number of images} = \frac{360}{\theta} - 1$$

(a) $\theta = 120^\circ$ $\frac{360}{120} - 1 = 3 - 1 = 2$ images

(b) $\theta = 45^\circ$ $\frac{360}{45} - 1 = 8 - 1 = 7$ images

(c) $\theta = 180^\circ$ $\frac{360}{180} - 1 = 2 - 1 = 1$ image

(d) $\theta = 60^\circ$ $\frac{360}{60} - 1 = 6 - 1 = 5$ images

(e) $\theta = 90^\circ$ $\frac{360}{90} - 1 = 4 - 1 = 3$ images

Long Answer Type Questions

1. (a) **Luminous objects** are objects that produce their own light, while (b) **non-luminous objects** do not. Examples of luminous objects include the sun and a light bulb, while examples of non-luminous objects include a table and a book. The Moon is a non-luminous object because it reflects sunlight; it does not produce its own light.
2. (a) Transparent materials allow light to pass through them completely, so objects can be seen clearly on the other side. Examples include glass and clear water.
(b) Translucent materials allow some light to pass through, but they scatter it, so objects on the other side are not seen clearly, which appears blurred. Examples are frosted glass and tracing paper.
(c) Opaque materials do not allow any light to pass through them. Instead, they block the light, which means no objects can be seen through them. Examples include wood and metal.
3. (a) **Two characteristics of the image formed in a plane mirror**
Virtual and erect: The image is virtual because the light rays do not actually converge there, and it is erect, which means it is upright.
Same size and distance: The image is the same size as the object and is located behind the mirror at the same distance as the object is in front of it.
(b) **One way our image differs from us is**
Laterally inverted: Our image in a plane mirror is a mirror image of us, which means our right hand appears as the left hand in the reflection. This is called lateral inversion.
4. (a) **Working of a periscope**
 - (i) A periscope is a tube with two parallel plane mirrors fitted inside at 45° angles to the ends of the tube.
 - (ii) Light from an object strikes the top mirror at a 45° angle.
 - (iii) The top mirror reflects the light down the tube at a 90° angle.
 - (iv) The light then strikes the bottom mirror, which is also angled at 45° to the tube.
 - (v) The bottom mirror reflects the light out of the tube and into the viewer's eye, which allows them to see objects that are not in their direct line of sight.
- (b) Yes, the tube can be used to make a periscope. To make a periscope, fix one plane mirror at the top end of the tube and the other at the bottom end, both at a 45° angle to the length of the tube, facing each other.
5. (a) In scenario (i), the ball is closer to the torch. This causes the light rays to spread out more after passing the ball, resulting in a larger shadow on the wall. In scenario (ii), the ball is closer to the wall. The light rays have a smaller area to spread out before they are blocked by the ball, which results in a smaller shadow. Therefore, the most accurate representation of the shadows formed: (i)(b), (ii)(a)

(b) Based on the principles of light and shadow formation, the correct matches are:

Column A	Column B
If the torch is close to the ball	The shadow would be larger
If the torch is far away	The shadow would be smaller
If the ball is removed from the setup	A bright spot would appear on the screen
If two torches are present in the setup on the left side of the ball	Two shadows would appear on the screen

Multiple Choice Questions (MCQ)

- (b) long
- (b) same colour as object
- (d) shining mirror
- (d)
- (d) water
- (c) glass cup
- (c) the moon
- (a) increases gradually
- (c) black in colour
- (c) periscope