# 15.CHANGES AROUND US - PHYSICAL & CHEMICAL CHANGES

## SOLUTIONS

## TEACHING TASK

## JEE MAINS LEVEL QUESTIONS

1. The original substance cannot be obtained in a:
   A) Physical change B) Chemical change
   C) Reversible change D) Temporary change

**Answer:B**

Solution:In a chemical change, new substances with different properties are formed and the original substance cannot be recovered

2. Copper(II) hydroxide when strongly heated becomes:

**(FA & SA- 3Marks / 4 Marks)**

   A) Black B) Blue C) Green D) Red

**Answer:A**

Solution:$Cu(OH)_2$ on heating decomposes to CuO (black) and $H_2O$.

3. Copper(II) hydroxide turning into black copper(II) oxide on heating is an example of:
   A) Physical change B) Chemical change
   C) Fast change D) Reversible change

**Answer:B**

Solution:A new substance (CuO) is formed, so it's a chemical change.

4. Which of the following statements is incorrect about physical changes?
   A) Physical changes are usually reversible
   B) Chemical composition of constituents remains unchanged
   C) Product exhibits properties of original substance
   D) New substances with entirely different properties are formed

**Answer:D**

Solution:A) True
   B) True
   C) True
   D) False — that's for chemical changes.

5. Slaked lime reacts with _____in the air to form a hard surface.
   A) $O_2$ B) $CO_2$ C) $N_2$ D) $H_2$

**Answer:B**

Solution: $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

Slaked lime is $Ca(OH)_2$, reacts with $CO_2$ to form $CaCO_3$ (hard).

6. Which of the following reactions produces a bright white flame ?
   A) Reaction between Aluminium and Oxygen
   B) Reaction between Calcium oxide and water
   C) Reaction between Iron and Copper(II) sulfate
   D) All of the above

**Answer:A**

Solution:When aluminium reacts with oxygen, it produces a vigorous combustion reaction, releasing a large amount of heat and light, resulting in a dazzling white flame.

7. Green vitriol is chemically: **(FA & SA- 5Marks / 8 Marks)**
   A) Copper sulfate B) Ferrous sulfate
   C) Magnesium sulfate D) Zinc sulfate

**Answer:B**

Solution:Green vitriol = $FeSO_4 \cdot 7H_2O$ (ferrous sulfate).

8. The gas evolved when Citric acid reacts with Sodium bicarbonate is:
**(FA & SA- 2 Marks)**
   A) Oxygen B) Carbon dioxide C) Nitrogen D) Hydrogen

**Answer:B**

Solution:Acid + carbonate $\rightarrow$ $CO_2$.

9. Substance "X" reacts with "Y" to give a gas which **turns lime water milky**. Then "X" and "Y" are:
   A) Citric acid and Sodium bicarbonate
   B) Calcium hydroxide and water
   C) Aluminium and Oxygen
   D) Copper and Iron(II) sulfate

**Answer:A**

Solution:The gas that turns lime water milky is carbon dioxide $CO_2$.The reaction between citric acid and sodium bicarbonate (baking soda) produces carbon dioxide gas.

10. Which is the standard test to detect $CO_2$?
   A) Reaction with Magnesium B) Passing through lime water
   C) Reaction with Iron D) Reaction with Zinc oxide

**Answer:B**

Solution:$CO_2$ turns lime water milky due to formation of calcium carbonate.

## JEE ADVANCED LEVEL QUESTIONS

**Multi correct answer type:**

11. Which of the following are typical indicators of chemical change?
   A) Change in temperature without external heating
   B) Change in color
   C) Formation of precipitate
   D) Change in state from solid to liquid

**Answer:A,B,C**

Solution:A) Change in temperature without external heating
B) Change in color
C) Formation of precipitate
These are typical indicators of a chemical change.
(Change in state from solid to liquid alone is not a reliable indicator of chemical change — it can be purely physical.)

12. Which of the following are examples of chemical change?
A) Burning of magnesium ribbon
B) Dissolving sugar in water
C) Rusting of iron
D) Reaction of hydrochloric acid with zinc

**Answer:A,C,D**

Solution:A) Burning of magnesium ribbon (new substance MgO formed)
B) Dissolving sugar in water (physical change)
C) Rusting of iron (chemical reaction with oxygen + moisture)
D) Reaction of hydrochloric acid with zinc ($Zn + HCl \rightarrow H_2$ gas + salt)

13. Which of the following statements about physical and chemical changes are true?
A) Physical changes are usually reversible, while chemical changes are irre versible
B) Formation of gas, change in temperature, and color change are indicators of chemical change
C) All physical changes involve energy changes
D) In a chemical change, the composition of the substance changes

**Answer:A,B,D**

Solution:A) Physical changes are usually reversible, chemical changes irreversible
B) Gas formation, temperature change, color change $\rightarrow$ chemical change indicators
C) All physical changes involve energy changes(Only some do; not all.)
D) In a chemical change, composition of the substance changes

**Assertion and Reason Type:**

A) Both A & R are true and R is the correct explanation of A
B) Both A & R are true and R is not the correct explanation of A
C) A is true, R is false.
D) A is false, R is true.

14. **Assertion (A)** : Melting of ice is a physical change.
**Reason (R)** : No new substance is formed when ice melts, and the change is reversible

**Answer:A**

Solution:Melting of ice is a physical change because no new substance is formed, and the change is reversible — Reason correctly explains Assertion.

15. **Assertion (A)** : Burning of paper is a chemical change.
**Reason (R)** : Paper changes only its state from solid to gas during

burning

**Answer:C**

Solution:Burning of paper is indeed a chemical change (new substances like $CO_2$ and ash form).

Reason is false because burning does not only involve a state change; it is a chemical decomposition/oxidation reaction.

**Matrix Matching Type:**

16. Column–I — Column–II

a) Ferrous sulfate ($FeSO_4 \cdot 7H_2O$) on heating — 1) Releases $CO_2$ gas

b) $CaCO_3$ on heating — 2) Blue to white change

c) Reaction of HCl with $Na_2CO_3$ — 3) Produces $Fe_2O_3 \cdot xH_2O$

d) Blue vitriol on heating — 4) Produces powdery residue

A) a–3, b–4, c–1, d–2 B) a–4, b–1, c–2, d–3

C) a–3, b–1, c–4, d–2 D) a–4, b–2, c–1, d–3

**Answer:A**

Solution:

a) Ferrous sulfate ($FeSO_4 \cdot 7H_2O$) on heating — 3) Produces $Fe_2O_3 \cdot xH_2O$

b) $CaCO_3$ on heating — 4) Produces powdery residue

c) Reaction of HCl with $Na_2CO_3$ — 1) Releases $CO_2$ gas

d) Blue vitriol on heating — 2) Blue to white change

17. Column–I — Column–II

a) Reaction of sodium with water — 1) Forms a gas that turns lime water milky

b) $CO_2 + Ca(OH)_2$ — 2) Reaction is highly exothermic and produces $H_2$ gas

c) Burning of magnesium — 3) White ash of MgO formed

d) Baking soda on heating — 4) Produces $CO_2$ gas with hissing sound

A) a–2, b–1, c–3, d–4 B) a–3, b–4, c–2, d–1

C) a–2, b–4, c–3, d–1 D) a–4, b–3, c–2, d–1

**Answer:A**

Solution:

a) Reaction of sodium with water — 2) Reaction is highly exothermic and produces $H_2$ gas

b) $CO_2 + Ca(OH)_2$ — 1) Forms a gas that turns lime water milky ($CO2$ + lime water $\rightarrow$ milky)

c) Burning of magnesium — 3) White ash of MgO formed

d) Baking soda on heating — 4) Produces $CO_2$ gas with hissing sound

**Comprehension Type:**

A chemical change is one where there are changes in the chemical properties of the components. Their chemical composition may change and the final product may have different properties as compared to the original components. Let us take the example of an apple. When you cut it and keep it in the open for some time, you will notice that it has a brownish hue on its surface. This happens because the acid in apple reacts with the atmospheric humidity and

other trace elements present and gives the apple surface a brownish-yellow color.

**Definition of Chemical Change:** .

A change which alters the specific properties of a substance by bringing about a change in its molecular composition, followed by a change in its state is called chemical change.

18. Which of the following best defines a chemical change?
    A) A change that only alters the state of a substance without forming a new substance
    B) A change in the molecular composition of a substance resulting in a new product with different properties
    C) A change that is always reversible
    D) A change that occurs only in liquids and gases

**Answer:B**

Solution:A chemical change always forms a new substance with new properties.

19. In the example of an apple turning brown after being cut, the brownish color is due to:
    A) A physical change in the apple's texture
    B) Reaction of acids in the apple with atmospheric humidity and trace elements
    C) Loss of water from the apple
    D) Freezing of the apple surface

**Answer:B**

Solution:More precisely, enzymes in the apple react with oxygen (oxidation reaction), leading to browning — a chemical change.

20. Which of the following is true about chemical changes?
    A) They do not change the chemical composition of the substance
    B) The final product may have completely different properties than the original substance
    C) They occur only at high temperatures
    D) They always involve a change in color only

**Answer:B**

Solution:Chemical reactions form substances with entirely new properties.

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## LEARNERS TASK

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## CONCEPTUAL UNDERSTANDING QUESTIONS

1. Which of the following is an example of irreversible physical change?
    A) Melting of ice
    B) Cutting of metal into pieces
    C) Dissolving salt in water
    D) Evaporation of alcohol

**Answer:B**

Solution:Melting of ice $\rightarrow$ reversible

Cutting of metal into pieces $\rightarrow$ irreversible physical change (can't get back exact original piece easily)

Dissolving salt in water →reversible
Evaporation of alcohol → reversible

2. Rusting of iron can be prevented by:
A) Painting or coating with oil B) Heating strongly in air
C) Breaking iron into small pieces D) Exposing iron to sunlight

**Answer:A**

Solution:A protective coating prevents contact with air/water and stops rusting.

3. Which of the following does not involve a chemical change?
A) Boiling of milk B) Combustion of kerosene
C) Fermentation of sugar D) Reaction of zinc with hydrochloric acid

**Answer:A**

Solution:Boiling is primarily a physical change (change of state). The other options are chemical processes

4. When a candle burns, which of the following happens?
A) Only physical change occurs
B) Only chemical change occurs
C) Both physical and chemical changes occur
D) Neither physical nor chemical change occurs

**Answer:C**

Solution:Wax melts (physical) + wax vapor burns (chemical).

5. Which of the following statements is true for chemical changes?
A) They are always reversible
B) Energy may be absorbed or released
C) They never produce gas
D) Only solids undergo chemical change

**Answer:B**

Solution:A) False — not always reversible
B) True — energy absorbed or released
C) False — can produce gas
D) False — not only solids

6. Heating of sugar in a pan produces a black residue. This is an example of:
A) Physical change B) Chemical change
C) Reversible change D) Temporary change

**Answer:B**

Solution:Heating sugar decomposes it to carbon (black residue) and other products — a chemical change.

7. Which of the following involves both color change and gas evolution?
A) Dissolving salt in water B) Reaction of vinegar with baking soda
C) Melting of ice D) Cutting of paper

**Answer:B**

Solution:Reaction of vinegar with baking soda
That reaction produces $CO_2$ gas (gas evolution) — and often visible fizzing; the other choices don't show both effect

8. Which of the following is a reversible chemical change?
A) Rusting of iron
B) Reaction of hydrogen with oxygen to form water
C) Dissociation of ammonium chloride on heating
D) Burning of wood

**Answer:C**

Solution:Dissociation of ammonium chloride means that when heated, ammonium chloride breaks down into ammonia and hydrogen chloride gases, but when cooled, these gases recombine to form ammonium chloride again. This process can be reversed by changing the temperature

9. Which statement is incorrect about physical changes?
A) The chemical composition remains unchanged
B) They are usually reversible
C) Energy changes are always significant
D) Only state or shape may change

**Answer:C**

Solution:A) True
B) True
C) False — energy changes are not always significant
D) True



10. Formation of clouds in the sky is:
A) Chemical change
B) Physical change
C) Both chemical and physical change
D) Non-periodic change

**Answer:B**

Solution:Cloud formation is condensation (water vapor $\rightarrow$ liquid droplets) — a physical change.

## JEE MAINS LEVEL QUESTIONS

11. Which of the following is an example of a chemical change involving energy release?
A) Condensation of steam
B) Combustion of hydrogen gas
C) Melting of wax
D) Freezing of water

**Answer:B**

Solution:B) Combustion of hydrogen gas – This is a chemical change releasing energy (exothermic).

12. Which of the following statements about physical and chemical changes is correct?

A) Physical changes always involve change in state only
B) Chemical changes always produce gas
C) Some physical changes can be irreversible
D) Chemical changes never involve energy change

**Answer:C**

Solution:C) Some physical changes can be irreversible – True; e.g., breaking glass.

13. When white phosphorus is exposed to air, it glows in the dark. This is:
**(FA & SA- 3Marks / 4 Marks)**

A) Physical change
B) Chemical change
C) Both physical and chemical change
D) Temporary change

**Answer:B**

Solution:B) Chemical change – White phosphorus glowing in air is slow oxidation (chemiluminescence).

14. Which of the following is a reversible chemical change?

A) Electrolysis of water
B) Rusting of iron
C) Burning of sugar
D) Fermentation of sugar to alcohol

**Answer:A**

Solution:A) Electrolysis of water – Water $\rightarrow$ hydrogen + oxygen, reversible by recombining them (though not spontaneous, the reaction is reversible).

15. Which of the following does not involve a chemical reaction?

A) Cooking of rice
B) Sublimation of iodine
C) Combustion of kerosene
D) Reaction of zinc with HCl

**Answer:B**

Solution:B) Sublimation of iodine – Only a physical change of state.

16. When ethanol burns, it:
**(FA & SA- 5Marks / 8 Marks)**

A) Produces $CO_2$ and $H_2O$
B) Changes only its state from liquid to gas
C) Produces a physical mixture of substances
D) Does not involve energy change

**Answer:A**

Solution:Produces $CO_2$ and $H_2O$ – Ethanol combustion gives these products (chemical change).

17. Which of the following is true for endothermic chemical changes ?

A) Energy is absorbed from the surroundings
B) Energy is released into the surroundings
C) No energy change occurs
D) Only physical properties change

**Answer:A**

Solution:Energy is absorbed from the surroundings – Definition of endothermic.

18. Which of the following is both a physical and chemical change?
A) Burning of candle B) Dissolving sugar in water
C) Melting of iron D) Sublimation of camphor

**Answer:A**

Solution: A) Burning of candle – Wax melts (physical) and burns (chemical).

19. Which of the following changes are reversible? **(FA & SA- 2 Marks )**
A) Melting of ice B) Dissolving salt in water
C) Burning of wood D) Rusting of iron

**Answer:A,B**

Solution:A) Melting of ice, B) Dissolving salt in water – Both reversible (by freezing and evaporating).

20. Which of the following involves change in chemical composition and formation of new substances?
A) Condensation of water vapor B) Baking soda reacts with vinegar
C) Boiling of milk D) Melting of wax

**Answer:B**

Solution:Baking soda reacts with vinegar Produces $CO_2$, water, and sodium acetate $\rightarrow$ chemical change

## JEE ADVANCED LEVEL QUESTIONS

**Multi correct answer type:**

21. Which of the following are indicators of chemical change?
A) Evolution of gas B) Change in color
C) Change in shape D) Formation of precipitate

**Answer:A,B,D**

Solution:A) Evolution of gas
B) Change in color
D) Formation of precipitate
These are common indicators of a chemical change. (Change in shape alone is not a reliable indicator — it can occur in physical changes.)

22. Which of the following statements are true about chemical changes?
A) They may be accompanied by gas evolution
B) They always involve color change
C) Energy may be absorbed or released
D) Physical state may change without chemical composition change

**Answer:A,C**

Solution:A) They may be accompanied by gas evolution
C) Energy may be absorbed or released
These are true statements about chemical changes.
(B is false because not all chemical changes involve a visible color change.)
(D is false because a physical state change alone is a physical change, not necessarily a chemical change.)

**Assertion and Reason Type:**

A. Both A & R are true and R is the correct explanation of A
B. Both A & R are true and R is not the correct explanation of A
C. A is true, R is false.
D. A is false, R is true.

23. **Assertion** : Rusting of iron is a chemical change.
**Reason** : Rusting occurs due to the reaction of iron with oxygen and moisture in air

**Answer:A**

Solution:Rusting is a chemical change because it involves a reaction between iron, oxygen, and moisture, forming new substances (iron oxides/hydroxides). The Reason correctly explains why it is a chemical change.

24. **Assertion** : Dissolving salt in water is a physical change.
**Reason** : The chemical composition of salt changes when it dissolves in water

**Answer:C**

Solution:Dissolving salt in water is indeed a physical change (no new substances formed, reversible by evaporation).
Reason is false because the chemical composition of salt (NaCl) does not change when dissolved — it remains as Na? and Cl? ions in solution, not a different compound.

**Matrix Matching Type:**

*25.*

| Column–I | Column–II |
|---|---|
| a) Decomposition of baking soda on heating | 1) Physical change |
| b) Melting of candle wax | 2) Produces $CO_2$ gas |
| c) Rusting of iron | 3) Chemical change |
| d) Dissolving sugar in water | 4) Prevents rusting |

A) a–2, b–1, c–3, d–4 B) a–3, b–2, c–1, d–4
C) a–2, b–3, c–1, d–4 D) a–3, b–1, c–2, d–4

**Answer:** a–2, b–1, c–3, d–1

Solution:

| | |
|---|---|
| a) Decomposition of baking soda on heating | 2) Produces $CO_2$ gas |
| b) Melting of candle wax | 1) Physical change |
| c) Rusting of iron | 3) Chemical change |
| d) Dissolving sugar in water | 1) Physical change |

26.

| Column–I | Column–II |
|---|---|
| a) Action of sunlight on silver chloride | 1) Physical change |
| b) Fermentation of grapes | 2) Produces alcohol and $CO_2$ |
| c) Boiling of water | 3) Chemical change |
| d) Coating iron with zinc | 4) Prevents rusting |

A) a–3, b–2, c–1, d–4 B) a–2, b–3, c–4, d–1
C) a–3, b–1, c–2, d–4 D) a–1, b–2, c–3, d–4

**Answer:A**

Solution:

| | |
|---|---|
| a) Action of sunlight on silver chloride | 3) Chemical change |
| b) Fermentation of grapes | 2) Produces alcohol and $CO_2$ |
| c) Boiling of water | 1) Physical change |
| d) Coating iron with zinc | 4) Prevents rusting |

**Comprehension Type:**

All substances around us undergo changes. In some cases, the changes are small and difficult to defect. In other cases, the changes are obvious and easy to defect. These changes generally get accerelated if we heat the substances. Most of these changes can be classified under two headings.

a) Physical change b) Chemical Change

27. Which of the following is true about changes in substances around us ?
    A) All changes are easy to observe
    B) Changes can be small and difficult to detect or obvious and easy to detect
    C) Changes occur only when substances are heated
    D) No changes occur in everyday life

**Answer:B**

Solution:Changes around us may be small and not easily detectable (like slow rusting), or large and very obvious (like burning paper).

28. Changes in substances can generally be classified into:
    A) Physical change and reversible change
    B) Temporary change and permanent change
    C) Physical change and chemical change
    D) Fast change and slow change

**Answer:C**

Solution:All changes in substances are broadly classified as physical changes and chemical changes.

**Integer type:**

29. A substance “X” on heating turns yellow and on cooling becomes white again. How many types of change (physical or chemical) does it exhibit?_____

**Answer:1**

Solution:The substance "X" exhibits a physical change.

The process described—turning yellow upon heating and returning to white upon cooling—indicates a reversible change in physical properties (color, likely due to a change in crystal structure or hydration state) rather than a change in chemical composition. A common example of this is Zinc Oxide (ZnO), which is white when cold and yellow when hot.

30. When 2 g of sodium bicarbonate reacts with acetic acid, carbon dioxide gas is released. How many products are formed in this reaction?_____

**Answer:3**

Solution: $NaHCO_3 + CH_3\ COOH \rightarrow CH_3\ COONa + H_2\ O + CO_2\uparrow$

Products:Sodium acetate ($CH_3COONa$),Water ($H_2O$)
Carbon dioxide ($CO_2$)
Number of products = 3

# KEY

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|---|---|---|---|---|---|---|---|---|---|
| | | | TEACHING TASK | | | | | | |
| | | JEE MAINS LEVEL QUESTIONS | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| B | A | B | D | B | A | B | B | A | B |
| | JEE ADVANCED LEVEL QUESTIONS | | | | | | | | |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A,B,C | A,C,D | A,B,D | A | C | A | A | B | B | B |
| | | | LEARNERS TASK | | | | | | |
| | CONCEPTUAL UNDERSTANDING QUESTIONS | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| B | A | A | C | B | B | B | C | C | B |
| | | JEE MAINS LEVEL QUESTIONS | | | | | | | |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| B | C | B | A | B | A | A | A | A,B | B |
| | JEE ADVANCED LEVEL QUESTIONS | | | | | | | | |
| 21 | 22 | 23 | 24 | 25 | | 26 | 27 | 28 | 29 |
| A,B,D | A,C | A | C | a–2, b–1, c–3, d–1 | | A | B | C | 1 |
| 30 | | | | | | | | | |
| 3 | | | | | | | | | |