

13.CHANGES AROUND US - SLOW & FAST CHANGES REVIERSIBLE & IRREVERSIBLE CHANGES

SOLUTIONS

TEACHING TASK

JEE MAIN LEVEL QUESTIONS

1. Which of the following processes is both reversible and endothermic under normal conditions?

A) Combustion of methane B) Dissolution of NaCl in water
C) Melting of ice at 0°C D) Rusting of iron

Answer:C

Solution:A) Combustion of methane → exothermic, irreversible.

B) Dissolution of NaCl in water → can be reversible by evaporation, but not always perfectly endothermic (slightly endothermic overall, but mainly physical).

C) Melting of ice at 0°C → reversible (freezing at 0°C), endothermic. ?

D) Rusting of iron → irreversible, exothermic

2. A chemical reaction is said to be irreversible when:

(FA & SA- 3 Marks / 4 Marks)

A) Products can easily change back into reactants.

B) Products are entirely different from reactants with no feasible reverse path.

C) The process involves only a physical state change.

D) Energy change is negligible.

Answer:B

Solution:Products cannot easily revert to reactants; the reverse process is not feasible.

3. The burning of magnesium ribbon in air is classified as: **(FA & SA- 2 Marks)**

A) Slow and reversible B) Fast and irreversible

C) Slow and irreversible D) Fast and reversible

Answer:B

Solution:Burning is a fast and irreversible reaction (forms MgO).

4. Which of the following is the best example of a slow and irreversible change?

A) Freezing of water B) Digestion of food

C) Evaporation of alcohol D) Condensation of steam

Answer:B

Solution:A) Freezing of water → reversible.

B) Digestion of food → slow, chemical, irreversible.

C) Evaporation of alcohol → reversible.

D) Condensation of steam → reversible.

5. An equilibrium reaction like $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ (Haber's process) is an example of:

(FA & SA- 5 Marks / 8 Marks)

- A) Slow and reversible change
- B) Fast and irreversible change
- C) Reversible chemical change under specific conditions
- D) Irreversible chemical change

Answer:C

Solution:Haber's process is Reversible chemical change under specific conditions (temperature, pressure, catalyst).

6. In a physical reversible change, which of the following remains unchanged?
- A) State of matter
 - B) Chemical composition
 - C) Energy involved
 - D) Mass of the system

Answer:B

Solution:The chemical composition remains unchanged.

7. Consider the following changes:

- (i) Fermentation of sugar
- (ii) Sublimation of iodine
- (iii) Evaporation of petrol
- (iv) Rusting of iron

How many of the above are irreversible chemical changes?

- A) 1
- B) 2
- C) 3
- D) 4

Answer:B

Solution:(i) Fermentation of sugar → chemical, irreversible.

(ii) Sublimation of iodine → physical, reversible.

(iii) Evaporation of petrol → physical, reversible.

(iv) Rusting of iron → chemical, irreversible.

Count = 2

8. The property that most clearly distinguishes a reversible physical change from an irreversible chemical change is:

- A) Involvement of energy
- B) Change in state
- C) Formation of a new substance
- D) Change in speed of reaction

Answer:C

Solution:Formation of a new substance occurs only in chemical change.

9. Which of the following is a slow and irreversible change?

- A) Melting of ice
- B) Rusting of iron
- C) Evaporation of alcohol
- D) Condensation of steam

Answer:B

Solution:Rusting of iron occurs slowly and cannot be reversed.

10. Which property best distinguishes a reversible change from an irreversible change?

- A) Speed of the process

- B) Energy exchange involved
- C) Possibility of regaining the original substance
- D) Phase transformation

Answer:C

Solution: Whether the original substance can be regained.

JEE ADVANCED LEVEL QUESTIONS

11. Which of the following are irreversible chemical changes?
- A) Burning of magnesium ribbon
 - B) Dissolution of sugar in water
 - C) Rusting of iron
 - D) Fermentation of sugar

Answer:A,C,D

Solution:

Burning of magnesium ribbon → Fast, irreversible chemical change (forms MgO).

Rusting of iron → Slow, irreversible chemical change (new substance Fe_2O_3 formed).

Fermentation of sugar → Irreversible chemical change (sugar → alcohol + CO_2).

Dissolution of sugar in water → Physical and reversible → Not correct

12. Which of the following processes are reversible physical changes?
- A) Sublimation of iodine
 - B) Freezing of water
 - C) Vaporization of petrol
 - D) Curdling of milk

Answer:A,B,C

Solution:

Process	Type	Reversible
Sublimation of iodine	Physical	Yes
Freezing/melting of water	Physical	Yes
Vaporization/condensation of petrol	Physical	Yes
Curdling of milk	Chemical	Irreversible

13. Identify the processes that are slow and irreversible:
- A) Growth of a plant
 - B) Evaporation of alcohol
 - C) Cooking of rice
 - D) Decay of dead organisms

Answer:A,C,D

Solution:

Process	Slow	Irreversible	Type
Growth of a plant	Yes	Yes	Chemical
Evaporation of alcohol	Fast	Reversible	Physical
Cooking of rice	Yes	Yes	Chemical
Decay of dead organisms	Yes	Yes	Chemical

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** : Melting of ice is a reversible change.

Reason : Melting of ice involves a chemical reaction between water molecules.

Answer:C

Solution:Melting of ice is a reversible physical change — water can freeze back into ice.

But it does not involve a chemical reaction. No new substance is formed; only the physical state changes (solid \rightleftharpoons liquid).

So, Assertion is true, Reason is false

15. **Assertion** : Combustion of wood is an irreversible change.

Reason : Combustion is a fast chemical change that produces heat, light, and new substances.

Answer:A

Solution:Burning wood is irreversible, as it forms ash, smoke, and gases, which cannot return to wood.

Combustion is a fast, irreversible chemical change, producing heat, light, and new substances.

The Reason correctly explains why combustion of wood is irreversible

Matrix Matching Type:

- | | |
|-------------------------------|--------------------------|
| 16. Group-A (Process) | Group-B (Classification) |
| a) Sublimation of Dry Ice | 1) Reversible change |
| b) Ripening of a Mango | 2) Irreversible change |
| c) Breaking of a Glass Window | 3) Fast change |
| d) Growth of a Tree | 4) Slow change |

A) a-1, b-2, c-3, d-4

B) a-3, b-4, c-2, d-1

C) a-1, b-4, c-3, d-2

D) a-3, b-2, c-1, d-4

Answer:a-1,3,b-2,4,c-2,3,d-2,4

Solution:

- | | |
|-------------------------------|---------------------------------------|
| a) Sublimation of Dry Ice | 1) Reversible change,3) Fast change |
| b) Ripening of a Mango | 2) Irreversible change,4) Slow change |
| c) Breaking of a Glass Window | 2) Irreversible change,3) Fast change |
| d) Growth of a Tree | 2) Irreversible change,4) Slow change |

Comprehension Type:

Change:

Change is the process by which a substance or object becomes different in its properties, state, form, or composition

Physical Change :

A change in which only the state, shape, size, or form of a substance changes, but no new substance is formed.

Example: Melting of ice, tearing of paper

Chemical Change :

A change in which the composition of the substance changes and a new substance is formed with different properties

Example: Rusting of iron, burning of wood

17. Which of the following best defines a physical change?

- A) A change in which a new substance is formed with different properties
- B) A change in which only the state, shape, size, or form of a substance changes, without forming a new substance
- C) A change that occurs only at high temperature
- D) A change that involves combustion

Answer:B

Solution:Physical changes do not produce new substances, only physical properties change (like shape, size, state).

18. Which of the following is an example of a chemical change?

- A) Melting of ice
- B) Tearing of paper
- C) Rusting of iron
- D) Freezing of water

Answer:C

Solution:Rusting forms a new substance (iron oxide) with different properties — a chemical change.

Melting and freezing of water → only physical state changes → physical changes.

Tearing paper → physical change (no new substance)

19. The process by which a substance changes its properties, state, form, or composition is called:

- A) Physical change
- B) Chemical change
- C) Change
- D) Transformation

Answer:C

Solution:Change is the process by which a substance or object becomes different in its properties, state, form, or composition.

Integer type:

20. Souring of milk, Burning of paper, Freezing of water, Rusting of iron.

How many irreversible changes are there ?

Answer:3

Solution:Souring of milk → chemical, irreversible

Burning of paper → chemical, irreversible

Freezing of water → physical, reversible

Rusting of iron → chemical, irreversible

Irreversible changes = 3

21. Melting of ice, Cooking of rice, Growth of a tree, Dissolving salt in water, Combustion of fuel. How many reversible changes are there?

Answer:2

Solution:Melting of ice → physical, reversible

Cooking of rice → chemical, irreversible
Growth of a tree → biological, irreversible
Dissolving salt in water → physical, reversible
Combustion of fuel → chemical, irreversible
Reversible changes = 2

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS

1. The burning of paper produces heat, light, and ash. This is classified as:
A) Fast and irreversible change B) Slow and reversible change
C) Fast and reversible change D) Slow and reversible change

Answer:A

Solution: Burning paper → rapid combustion producing new substances (ash), not reversible.

2. The melting of wax on a candle is a:
A) Reversible physical change B) Irreversible chemical change
C) Slow chemical change D) Fast chemical change

Answer:A

Solution: Physical change, reversible (wax solidifies on cooling).

3. Photosynthesis in plants is a:
A) Fast reversible change B) Slow irreversible change
C) Slow reversible change D) Fast irreversible change

Answer:B

Solution: Photosynthesis is a slow biochemical (chemical) process that doesn't simply reverse

4. Dissolving sugar in water is considered:
A) Irreversible chemical change B) Reversible physical change
C) Slow chemical change D) Fast irreversible change

Answer:B

Solution: Physical change, reversible (evaporate water to get sugar back).

5. Rusting of iron occurs over a long period and cannot be reversed. It is:
A) Fast reversible change B) Slow irreversible change
C) Fast irreversible change D) Slow reversible change

Answer:B

Solution: Rusting is gradual and produces new compounds (iron oxides)

6. Boiling of water on a stove:
A) Reversible change B) Irreversible change
C) Slow irreversible change D) Fast chemical change

Answer:A

Solution: Physical change, reversible (condense vapor back to water).

7. The growth of a seed into a plant is:

- A) Fast reversible change
- B) Slow irreversible change
- C) Fast irreversible change
- D) Slow reversible change

Answer: B

Solution: Biological change, slow, irreversible (cannot turn plant back into seed exactly).

8. Condensation of steam into water:

- A) Irreversible change
- B) Reversible physical change
- C) Slow chemical change
- D) Fast chemical change

Answer: B

Solution: Condensation \leftrightarrow evaporation are reversible phase change.

9. Cooking an egg is:

- A) Slow reversible change
- B) Fast irreversible change
- C) Slow irreversible change
- D) Fast reversible change

Answer: B

Solution: When an egg is cooked, the heat denatures the proteins in the egg white and yolk, causing them to solidify and change structure. This is a chemical change that cannot be reversed by simply cooling the egg back down. Additionally, the process of cooking happens relatively quickly, making it a fast change.

10. Evaporation of alcohol from a solution is:

- A) Reversible physical change
- B) Irreversible chemical change
- C) Slow irreversible change
- D) Fast chemical change

Answer: A

Solution: Physical change, reversible (condense alcohol vapor back to liquid).

JEE MAIN LEVEL QUESTIONS

1. Which of the following is a slow irreversible change occurring naturally?

- A) Boiling of water
- B) Rusting of iron
- C) Combustion of LPG
- D) Melting of ice

Answer: B

Solution: Rusting happens slowly and cannot be reversed.

2. Which of the following is an example of a fast physical change?

- A) Evaporation of water at room temperature
- B) Breaking of a glass
- C) Rusting of iron
- D) Aging of a fruit

Answer: B

Solution: Breaking happens instantly and is a physical change (no new substance)

3. Which of the following changes can be classified as reversible chemical change?
- A) Photosynthesis
 - B) Formation of ammonia (Haber's process under equilibrium)
 - C) Ripening of mango
 - D) Combustion of wood

Answer:B

Solution:Photosynthesis → irreversible

Formation of ammonia (Haber's process under equilibrium) → reversible chemical change

Ripening of mango → irreversible

Combustion of wood → irreversible.

4. Sublimation of iodine is considered: **(FA & SA- 3 Marks / 4 Marks)**
- A) Slow irreversible change
 - B) Reversible physical change
 - C) Fast chemical change
 - D) Slow reversible change

Answer:B

Solution:Iodine changes solid ↔ gas without new substance formation.

5. Which of the following is a fast irreversible chemical change?
- A) Boiling of water
 - B) Burning of magnesium ribbon
 - C) Melting of wax
 - D) Freezing of water

Answer:B

Solution:Boiling of water → physical, reversible

Burning of magnesium ribbon → chemical, fast, irreversible

Melting of wax → physical, reversible

Freezing of water → physical, reversible.

6. Germination of a seed is: **(FA & SA- 2 Marks)**
- A) Fast reversible change
 - B) Slow irreversible change
 - C) Fast irreversible change
 - D) Slow reversible change

Answer:B

Solution:Germination is slow, natural, and cannot be reversed.

7. Condensation of steam into water is an example of: **(FA & SA- 5Marks / 8 Marks)**
- A) Reversible physical change
 - B) Slow irreversible change
 - C) Fast chemical change
 - D) Slow reversible change

Answer:A

Solution:Vapor changes back to liquid; physical and reversible.

8. Which of the following is both fast and irreversible?
- A) Evaporation of alcohol
 - B) Bursting of a firecracker
 - C) Freezing of water
 - D) Melting of ice

Answer:B

Solution: Bursting of a firecracker ,Happens instantly and forms new substances

(ash, smoke, gases)

9. Aging of humans is classified as:
- | | |
|-----------------------------|-----------------------------|
| A) Slow reversible change | B) Fast irreversible change |
| C) Slow irreversible change | D) Fast reversible change |

Answer:C

Solution: Aging of humans → slow, irreversible

10. Which of the following is an example of reversible slow physical change?
- | | |
|------------------------|--------------------------|
| A) Melting of glaciers | B) Rusting of iron |
| C) Cooking of food | D) Bursting of a balloon |

Answer:A

Solution: Melting of glaciers → slow, physical, reversible

Rusting of iron → chemical, irreversible

Cooking of food → irreversible

Bursting of a balloon → fast, irreversible

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:

11. Which of the following statements are incorrect?
- The melting of glaciers due to global warming is a reversible change under current environmental conditions.
 - The formation of a delta by a river is a fast change.
 - Dissolving carbon dioxide gas in water under high pressure to make soda water is an irreversible chemical change.
 - The curdling of milk upon adding lemon juice is a slow physical change.

Answer:A,B,C,D

Solution:

Option	Correct / Incorrect	Explanation
A	Incorrect	Melting of glaciers is reversible physically, but under current environmental conditions (global warming), practically it becomes irreversible. So statement is misleading
B	Incorrect	Formation of delta is a very slow process, not fast.
C	Incorrect	Dissolving CO ₂ in water is a reversible physical change, not irreversible chemical.
D	Incorrect	Curdling of milk is a slow irreversible chemical change, not physical.

12. Which of the following statements are correct regarding the classification of changes?
- The bursting of a balloon is a fast physical change, but it is irreversible.
 - The formation of clouds through evaporation and condensation is a reversible change.
 - The digestion of food in the human body is a slow chemical change that is

irreversible.

D) The magnetization of an iron nail is a reversible physical change.

Answer:A,B,C,D

Solution:

A) Bursting of a balloon is a fast physical change, but irreversible → Correct

B) Formation of clouds through evaporation and condensation is a reversible change → Correct (water cycle)

C) Digestion of food in human body is a slow chemical change that is irreversible → Correct

D) Magnetization of an iron nail is a reversible physical change → Correct

So all four are correct statements

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.

13. **Assertion** : Freezing of water is a reversible physical change.

Reason : Freezing involves only a change in the state of water and no new substance is formed

Answer:A

Solution:Both statements are true, and

The Reason correctly explains why freezing is a reversible physical change

14. **Assertion** : Rusting of iron is a slow irreversible change.

Reason : Rusting produces a new substance over time, which cannot revert back to iron

Answer:A

Solution:Both statements are true, and

The reason correctly explains why rusting is slow and irreversible

Matrix Matching Type:

15. Group-A (Process/Change)

a) Melting of butter

b) Eruption of a volcano

c) Dissolving sugar in water

d) Cooking of rice

Group-B (Classification)

1) Slow change

2) Fast change

3) Reversible change

4) Irreversible change

Answer:a-1,3,b-2,4,c-1,3,d-1,4

Solution:

a) Melting of butter

b) Eruption of a volcano

c) Dissolving sugar in water

d) Cooking of rice

1) Slow change ,3) Reversible change

2) Fast change ,4) Irreversible change

1) Slow change,3) Reversible change

1) Slow change,4) Irreversible change

Comprehension Type:

A Change which can be reversed is called a **reversible change**. In this change, the products formed can be converted back into their original forms. For example, Water can be changed into ice by placing it in the freezing chamber of the fridge. The ice so formed can be converted back into water by placing the ice outside the fridge.

16. A change in which the products can be converted back to their original form is called:
- | | |
|------------------------|----------------------|
| A) Irreversible change | B) Reversible change |
| C) Slow change | D) Fast change |

Answer:B

Solution:A change in which the products can be converted back to their original form → Reversible change.

17. Which of the following is an example of a reversible change?
- | | |
|-------------------------------------|--------------------|
| A) Burning of paper | B) Rusting of iron |
| C) Melting of ice and refreezing it | D) Cooking of rice |

Answer:C

Solution:A) Burning of paper → irreversible
B) Rusting of iron → irreversible
C) Melting of ice and refreezing it → reversible
D) Cooking of rice → irreversible

Integer Type:

18. How many of the following processes are irreversible changes?
Burning of wood, Melting of wax, Rusting of iron, Dissolving salt in water, Curdling of milk

Answer:3

Solution:Burning of wood → chemical change, irreversible
Melting of wax → physical change, reversible
Rusting of iron → chemical change, irreversible
Dissolving salt in water → physical change, reversible
Curdling of milk → chemical change, irreversible
Irreversible changes = 3

KEY

TEACHING TASK									
JEE MAIN LEVEL QUESTIONS									
1	2	3	4	5	6	7	8	9	10
C	B	B	B	C	B	B	C	B	C
JEE ADVANCED LEVEL QUESTIONS									
11	12	13	14	15	16			17	18
A,C,D	A,B,C	A,C,D	C	A	a-1,3,b-2,4,c-2,3,d-2,4			B	C
19	20	21							
C	3	2							
LEARNERS TASK									
CONCEPTUAL UNDERSTANDING QUESTIONS									
1	2	3	4	5	6	7	8	9	10
A	A	B	B	B	A	B	B	B	A
JEE MAIN LEVEL QUESTIONS									
1	2	3	4	5	6	7	8	9	10
B	B	B	B	B	B	A	B	C	A
JEE ADVANCED LEVEL QUESTIONS									
11	12	13	14	15			16	17	18
A,B,C,D	A,B,C,D	A	A	a-1,3,b-2,4,c-1,3,d-1,4			B	C	3