NCERT Exemplar Solutions for Class 6 Science
Chapter 6: Changes Around Us

Multiple Choice Questions

1. Pick the change that can be reversed from the following.

(a) Cutting of trees
(b) Melting of ghee
(c) Burning of candle
(d) Blooming of flower

Solution: (b) Melting of ghee

Explanation: Melting of ghee is a reversible change because the melted ghee can be solidified again by cooling. This is a physical change where only the state of matter changes from solid to liquid and can be reversed.

- Cutting of trees: Irreversible - once cut, trees cannot be restored to their original form
- Burning of candle: Irreversible - wax is converted to carbon dioxide and water vapor
- Blooming of flower: Irreversible - this is a natural biological process that cannot be undone

2. Which of the following change cannot be reversed?

(a) Hardening of cement
(b) Freezing of ice cream
(c) Opening a door
(d) Melting of chocolate

Solution: (a) Hardening of cement

Explanation: Hardening of cement is an irreversible chemical change. When cement is mixed with water, it undergoes a chemical reaction (hydration) that permanently changes its composition and structure. Once hardened, it cannot return to its original powdered form.

- Freezing of ice cream: Reversible - can be melted and refrozen
- Opening a door: Reversible - can be closed again
- Melting of chocolate: Reversible - can be solidified by cooling

3. An iron ring is heated. Which of the following statement about it is incorrect?

(a) The ring expands
(b) The ring almost comes to the same size on cooling
(c) The change in this case is reversed
(d) The ring changes its shape and the change cannot be reversed

Solution: (d) The ring changes its shape and the change cannot be reversed

Explanation: This statement is incorrect because thermal expansion and contraction of metals is a reversible physical change. When an iron ring is heated, it expands due to increased molecular motion. Upon cooling, the molecules slow down and the ring contracts back to approximately its original size. The shape doesn't permanently change, and the process is completely reversible.

4. While lighting a candle, Paheli observed the following changes.

(i) Wax was melting
(ii) Candle was burning
(iii) Size of the candle was reducing
(iv) Melted wax was getting solidified
Of the above, the changes that can be reversed are: (a) (i) and (ii)
(b) (ii) and (iii)
(c) (iii) and (iv)
(d) (i) and (iv)
Solution: (d) (i) and (iv)
Explanation:

- **(i) Wax was melting:** Reversible - solid wax can be melted and then solidified again
- **(iv) Melted wax was getting solidified:** Reversible - this is the reverse of melting

The other changes are irreversible:

- **(ii) Candle was burning:** Irreversible - burning is a chemical change that produces new substances
- **(iii) Size of candle was reducing:** Irreversible - the burned portion cannot be restored

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5. Salt can be separated from its solution (salt dissolved in water), because:
(a) Mixing of salt in water is a change that can be reversed by heating and melting of salt
(b) Mixing of salt in water is a change that cannot be reversed
(c) Mixing of salt in water is a permanent change
(d) Mixing of salt in water is a change that can be reversed by evaporation
Solution: (d) Mixing of salt in water is a change that can be reversed by evaporation
Explanation: When salt dissolves in water, it forms a homogeneous mixture (solution). This is a physical change, not a chemical change. The salt molecules remain unchanged and can be recovered by evaporating the water. The process is completely reversible - no new substances are formed during dissolution.

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6. Rolling of chapati and baking of chapati are the changes that:
(a) Can be reversed
(b) Cannot be reversed
(c) Can be reversed and cannot be reversed, respectively
(d) Cannot be reversed and can be reversed, respectively
Solution: (c) Can be reversed and cannot be reversed, respectively
Explanation:

- **Rolling of chapati:** Reversible physical change - the rolled dough can be gathered back into a ball
- **Baking of chapati:** Irreversible chemical change - heat causes chemical reactions in the flour that permanently change its structure and properties

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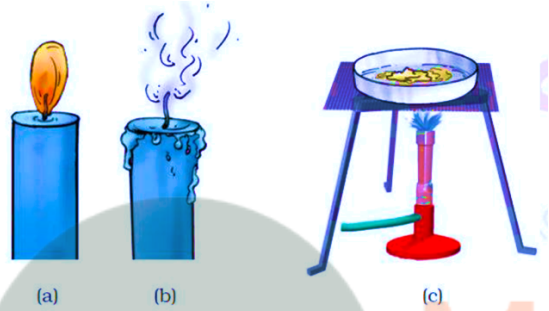
7. Iron rim is made slightly smaller than the wooden wheel. The rim is usually heated before fixing into the wooden wheel, because on heating the iron rim:
(a) Expands and fits onto the wooden wheel
(b) Contracts and fits onto the wooden wheel
(c) No change in the size takes place
(d) Expands first, then on cooling contracts and fits onto the wooden wheel

Solution: (d) Expands first, then on cooling contracts and fits onto the wooden wheel
Explanation: This is a practical application of thermal expansion. The process works as follows:

1. The iron rim is made slightly smaller than the wooden wheel
2. When heated, the iron rim expands due to thermal expansion
3. The expanded rim now fits over the wooden wheel
4. As it cools down, the rim contracts and grips the wooden wheel tightly
5. This creates a very secure fitting that won't come loose

Very Short Answer Questions
8. Look at figure 6.1 which shows three situations:
(a) A burning candle
(b) An extinguished candle
(c) Melting wax



Which of these shows a reversible change and why?
Solution: (c) Melting wax shows a reversible change.
Explanation: Melting of wax is a physical change where solid wax changes to liquid state due to heat. This change is reversible because the melted wax can be solidified again by cooling. No new chemical substances are formed during this process - it's simply a change of state.

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9. A piece of iron is heated till it becomes red-hot. It then becomes soft and is beaten to a desired shape. What kinds of changes are observed in this process - reversible or irreversible?
Solution: This is a **reversible change**.
Explanation: When iron is heated and beaten into a desired shape, only its physical form changes. The chemical composition of iron remains the same. The shaped iron object can be heated again and reshaped or even melted back to its original form. This process is used in blacksmithing and metalworking, where the same piece of metal can be reshaped multiple times.

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10. Paheli had bought a new bottle of pickle from the market. She tried to open the metal cap to taste it but could not do so. She then took a bowl of hot water and immersed the upper end of the bottle in it for five minutes. She could easily open the bottle now. Can you give the reason for this?
Solution: The metal cap expanded when heated, making it easier to open.
Explanation: When the metal cap is immersed in hot water, it undergoes thermal expansion. Metals expand when heated because the molecules move faster and take up more space.

The expanded cap becomes slightly larger and looser on the bottle threads, reducing the friction and making it easier to twist open. This is a reversible physical change - the cap will contract back to its original size when it cools down.

Short Answer Questions

11. Can we reverse the following changes? If yes, suggest the name of the method.

(a) Water into water vapour
(b) Water vapour into water
(c) Ice into water
(d) Curd into milk

Solution: (a) **Water into water vapour:** Yes, by **condensation** - cooling the water vapour will convert it back to liquid water
(b) **Water vapour into water:** Yes, by **evaporation** - heating liquid water will convert it to water vapour
(c) **Ice into water:** Yes, by **freezing** - cooling liquid water below 0°C will convert it back to ice
(d) **Curd into milk:** No, this is an **irreversible process** - curd formation involves bacterial fermentation that permanently changes the chemical composition of milk

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12. Which of the following changes cannot be reversed?

(a) Blowing of a balloon
(b) Folding a paper to make a toy aeroplane
(c) Rolling a ball of dough to make roti
(d) Baking cake in an oven
(e) Drying a wet cloth
(f) Making biogas from cow dung
(g) Burning of a candle

Solution: The following changes **cannot be reversed:**
(d) Baking cake in an oven - Chemical changes occur during baking that permanently alter the ingredients
(f) Making biogas from cow dung - This involves decomposition and chemical breakdown that cannot be reversed
(g) Burning of a candle - Combustion produces new chemical compounds (CO_2, H_2O) that cannot be converted back to wax
Explanation: These are irreversible changes because they involve chemical reactions that create new substances with different properties than the original materials.

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13. Boojho's sister broke a white dove, a symbol of peace, made of Plaster of Paris (POP). Boojho tried to reconstruct the toy by making a powder of the broken pieces and then making a paste by mixing water. Will he be successful in his effort? Justify your answer.
Solution: No, Boojho will not be successful.
Explanation: Making a toy from Plaster of Paris involves an irreversible chemical change. When POP powder is first mixed with water, it undergoes a chemical reaction called hydration, forming new crystal structures that give it strength and hardness. Once this reaction is complete and the POP has set, it cannot be reversed. Simply grinding it to powder and adding water again will not restore its original binding properties. The chemical

composition has permanently changed, so the reformed paste will not have the same strength or setting ability as fresh POP.

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14. Tearing of paper is said to be a change that cannot be reversed. What about paper recycling?
Solution: Paper recycling is also an irreversible change.
Explanation: Although paper recycling allows us to make new paper from old paper, it doesn't reverse the original tearing. During recycling:

- The paper is broken down into pulp through chemical and mechanical processes
- The fiber structure is altered
- The quality, color, and texture of the recycled paper differs from the original
- We get a new type of paper, not the original paper restored to its previous state

The recycled paper has different properties and cannot be considered the same as the original paper that was torn.

Long Answer Questions
15. Give one example in each case:
(a) Change which occurs on heating but can be reversed
(b) Change which occurs on heating but cannot be reversed
(c) Change which occurs on cooling but can be reversed
(d) Change which occurs on mixing two substances, but can be reversed
(e) Change which occurs on mixing two substances, but cannot be reversed
Solution:
(a) **Heating of an iron rod** - The rod expands when heated and contracts when cooled (thermal expansion/contraction)
(b) **Baking of chapati** - Heat causes chemical changes in flour that cannot be undone
(c) **Formation of ice from water** - Water freezes to ice when cooled and melts back to water when heated
(d) **Formation of salt solution** - Salt dissolves in water and can be recovered by evaporation
(e) **Mixing of cement with water** - Forms concrete through chemical bonding that cannot be reversed

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16. A potter working on his wheel shaped a lump of clay into a pot. He then baked the pot in an oven. Do these two acts lead to the same kind of changes or different? Give your opinion and justify your answer.
Solution: These two acts lead to different kinds of changes.
Explanation:
Shaping clay on the wheel:

- This is a **reversible physical change**
- Only the shape of clay changes, not its chemical composition
- The clay can be reshaped by adding water and remolding

Baking the pot in an oven:

- This is an **irreversible chemical change**
- Heat causes chemical reactions in the clay
- Water molecules are permanently driven out
- The clay hardens and becomes ceramic

- Cannot be converted back to moldable clay

The first process changes only the physical form, while the second changes the chemical structure permanently.

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17. Conversion of ice into water and water into ice is an example of change which can be reversed. Give four more examples where you can say that the changes can be reversed.
Solution: Examples of reversible changes:

1. **Folding of paper** - Paper can be folded and unfolded without changing its properties
2. **Melting of wax** - Solid wax melts to liquid when heated and solidifies when cooled
3. **Knitting of a sweater** - Yarn can be knitted into a sweater and then unraveled back to yarn
4. **Inflating a tyre or balloon** - Air can be pumped in to inflate and released to deflate

Explanation: All these changes are reversible because they only involve physical changes where the original properties and composition of materials remain unchanged.

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18. Change of a bud into a flower is a change which cannot be reversed. Give four more such examples.
Solution: Examples of irreversible changes:

1. **Digestion of food** - Food is broken down into nutrients through chemical processes
2. **Ripening of fruits** - Chemical changes occur that alter taste, color, and texture permanently
3. **Burning of wood** - Wood is converted to ash, carbon dioxide, and water vapor
4. **Milk into curd** - Bacterial action converts milk proteins into curd through fermentation

Explanation: These are all irreversible changes because they involve chemical reactions that create new substances with different properties from the original materials.

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19. Paheli mixed flour and water and (i) made dough, (ii) rolled the dough to make a chapati, (iii) baked the chapati on a pan, (iv) dried the chapati and ground it in a grinder to make powder. Identify the changes (i) to (iv) as the changes that can be reversed or that cannot be reversed.
Solution:
(i) Making dough from flour and water: Irreversible change

- Water molecules bond with flour proteins and starches, changing the structure

(ii) Rolling the dough to make a chapati: Reversible change

- Only the shape changes; the dough can be gathered back into a ball

(iii) Baking the rolled chapati on a pan: Irreversible change

- Heat causes chemical changes that permanently alter the flour structure

(iv) Grinding dried chapati in a grinder: Irreversible change

- Physical breakdown that destroys the structure permanently

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20. It was Paheli's birthday, her brother Simba was helping her to decorate the house for the birthday party and their parents were also busy making other arrangements. Following were the activities going on at Paheli's home:
(i) Simba blew balloons and put them on the wall
(ii) Some of the balloons got burst

(iii) Paheli cut colorful strips of paper and put them on the wall with the help of tape
(iv) She also made some flowers by origami (paper folding) to decorate the house
(v) Her father made dough balls
(vi) Mother rolled the dough balls to make puries
(vii) Mother heated oil in a pan
(viii) Father fried the puries in hot oil
Identify the activities at Paheli's home as those that can be reversed and those which cannot be reversed.

Solution:

Activities which are reversible:

(i) Simba blew balloons and put them on the wall

- Air can be released from balloons

(iv) She also made some flowers by origami (paper folding)

- Paper can be unfolded back to its original shape

(v) Her father made dough balls

- Dough can be reshaped into different forms

(vi) Mother rolled the dough balls to make puries

- Rolled dough can be gathered back into balls

(vii) Mother heated oil in a pan

- Oil returns to room temperature when heating stops

Activities which are irreversible:

(ii) Some of the balloons got burst

- Burst balloons cannot be repaired to hold air again

(iii) Paheli cut colorful strips of paper

- Cut paper cannot be rejoined to its original form

(viii) Father fried the puries in hot oil

- Frying causes chemical changes that permanently alter the food

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Note: This document provides comprehensive solutions with detailed explanations for better understanding of the concepts of reversible and irreversible changes.