

NEW ERA PUBLIC SCHOOLSubject :- ScienceTopic :- Heat and Its EffectsClass :- 7thLesson no :- 4Solved Assignment of Unit-II→ Short Answer Questions :-D. Answer in brief.Q1 :- Give important effects of heat.Ans :- The important effects of heat are change in temperature, expansion, change of state and chemical or biological changes.Q2 :- Why do electric wires sag between poles on a hot day?Ans :- The lines are often heavily loaded because of increased power consumption and the conductors which are generally made of copper or aluminium expand when heated. That expansion increases the slack between transmission line structures causing them to sag.Q3 :- Why are liquids used in a thermometer?Ans :- The liquids used in a thermometer has moderate co-efficient of expansion so as to measure body temperature whereas solids have very low and gases have very high co-efficient of expansion.

Q4:- Name the three commonly used scales of temperature.

Ans:- Celsius ($^{\circ}\text{C}$), Fahrenheit ($^{\circ}\text{F}$) and Kelvin scale are the three commonly used scales of temperature.

Q5:- Under what conditions is it better to use alcohol instead of mercury in a thermometer?

Ans:- Alcohol is another liquid used in thermometers. Its freezing point is much lower than that of mercury. Therefore, alcohol thermometers are useful in very cold places.

→ Long Answer Questions:-

E. Answer in detail.

Q1:- Discuss the effects of heat?

Ans:- The effects of heat are:-

1. Heat can be transferred from one object to another.
2. Heat flows from a region of higher temperature to a region of lower temperature.
3. Heat can also be converted into other forms of energy. For example, heat energy can be converted to mechanical energy and vice-versa.
4. Expansion is one of the effects of heat. Matter in all forms — solid, liquid or gas — expands on heating.

Q2:- How is a smaller metal rim fitted on a bigger wooden wheel?

Ans:- The wheels of bullock carts have metal rims that are slightly smaller than the wooden wheel. A metal rim is heated so that it expands and can be fitted over the wooden wheel. When the metal rim cools, it contracts and grips the wheel firmly.

Q3:- Describe a simple experiment to show that solids expand on heating.

Ans:- Aim :- To observe expansion in solids due to heat.

Materials required :- ball-and-ring apparatus, Bunsen burner.

Method :- The ball-and-ring apparatus consists of a metal ball which fits exactly through a ring attached to a stand when both are at room temperature. Heat the ball using a Bunsen burner for a few minutes and then try to pass it through the ring.

Observations and conclusions :- The ball does not pass through the ring when it is hot. Leave the ball on the ring and allow it to cool for sometime. The ball will now pass through the ring. The hot ball does not pass through the ring because it has expanded. This proves that solids expand on heating and contract on cooling.

→ Draw Diagram (Fig 4.1) — Expansion in Solids
on Pg. no 32 on book

Q4:- Why are gaps left between lengths of rail in a railway line?

Ans:- Gaps are left between lengths of rail in a railway line to allow the metal rails to expand due to the heat of the summer and the heat generated by friction.

Q5:- Convert.

(i) 66°C into $^{\circ}\text{F}$

$$\text{Sol:- } F = \frac{9}{5} C + 32$$

$$F = \frac{9}{5} \times 66 + 32$$

$$F = 594 \div 5 + 32$$

$$F = 118.8 + 32$$

$$F = 150.8^{\circ}$$

(ii) 37°C into $^{\circ}\text{F}$

$$\text{Sol:- } F = \frac{9}{5} C + 32$$

$$F = \frac{9}{5} \times 37 + 32$$

$$F = 333 \div 5 + 32$$

$$F = 66.6 + 32$$

$$F = 98.6^{\circ}$$

(iii) 212°F into $^{\circ}\text{C}$

$$\text{Sol:- } C = \frac{5}{9} (F - 32)$$

$$C = \frac{5}{9} (212 - 32)$$

$$C = \frac{5}{9} \times 180$$

$$C = 900 \div 9$$

$$C = 100^{\circ}$$

(iv) 135°F into $^{\circ}\text{C}$

$$\text{Sol:- } C = \frac{5}{9} (F - 32)$$

$$C = \frac{5}{9} (135 - 32)$$

$$C = \frac{5}{9} \times 103$$

$$C = 515 \div 9$$

$$C = 57.2^{\circ}$$

Q6:- Draw a labelled diagram of a clinical thermometer. Explain the function of the kink in the stem.

Ans:- When the thermometer is placed under the tongue or under the arm of a person, the mercury expands due to the warmth and pushes past the kink.

When the thermometer is removed, the mercury in the bulb cools and contracts. This breaks the contact of the mercury in the stem with the mercury in the bulb. The mercury in the stem stays where it is and does not drop back into the bulb. So the temperature can be read easily.

→ Draws Diagram (Fig 4.7) 'b' part (Clinical Thermometer) on Pg. no 36 on book.

Q7:- State two differences between a laboratory thermometer and a clinical thermometer. Give the reason for each difference.

<u>Ans:-</u> <u>Laboratory Thermometer</u>	<u>Clinical Thermometer</u>
1. This thermometer is usually used in laboratories to check the temperature during experiments.	1. The clinical thermometer is used to measure the temperature of the human body.
2. They are usually graduated from -10°C to 110°C .	2. A clinical thermometer is graduated from 34°C to 42°C .

→ Objective Type Questions:-

A. Multiple choice Questions.

→ <u>KEY:-</u>	3. c	6. c
1. a	4. d	7. d
2. c	5. c	8. a

B. Fill in the blanks.

- | | |
|------------------------|------------|
| 1. Heat, higher, lower | 6. 10 |
| 2. heat | 7. 32 |
| 3. expand | 8. 0, 32 |
| 4. hotness, coldness | 9. Mercury |
| 5. Celsius | |

C. Say whether the statements are true or false.

- | | |
|------|------|
| 1. T | 6. T |
| 2. T | 7. F |
| 3. F | 8. T |
| 4. F | 9. F |
| 5. F | |

Topic:- Transfer of Heat

Lesson no:- 5

→ Short Answer Questions:-

D. Answer in brief.

Q1:- What are the three ways of transferring heat?

Ans:- The three ways of transferring heat are conduction, convection and Radiation.

Q2:- Define conduction.

Ans:- The transfer of heat from a hot object to

a less hot object when they are in contact is called conduction of heat.

Q3:- List the conditions needed for transfer of heat by conduction.

Ans:- The conditions needed for transfer of heat by conduction are:-

1. The two bodies should be in contact.
2. The two bodies should be at different temperatures.

Q4:- What are good conductors of heat? Give two examples.

Ans:- Materials that conduct heat readily are called good conductors of heat. Brass and aluminium are two examples of good conductors of heat.

Q5:- What do you mean by convection of heat?

Ans:- The process by which heat is transmitted in liquids and gases by the actual movement of molecules is called convection.

Q6:- What are convection currents?

Ans:- The continuous movement that is seen when a warm substance rises and a cooler substance settles down in its place is called a convection current.

Q7:- Can the transfer of heat by convection occur in solids? Why?

Ans:- NO, the transfer of heat by convection doesn't.

occur in solids because convection only occurs in liquids and gases.

Q8:- On what factors does the heat radiated by a hot body depend?

Ans:- The amount of heat radiated by a body depends on its temperature, its colour and the nature of its surface.

Q9:- What is the function of the reflecting surface provided in an electric room heater?

Ans:- In an electric room heater, a polished reflector is provided behind the heating element to reflect radiant heat towards the front.

Q10:- Why is it advisable to wear white or light-coloured clothes on a hot day?

Ans:- White or light coloured clothes are worn in summer because they don't absorb sunlight and hence keep us cool.

→ Long Answer Questions:-

E. Answer in detail.

Q1:- Explain how conduction of heat occurs in a solid metal rod.

Ans:- Aim:- To observe conduction of heat in a solid metal rod.

Materials required:- metal rod, candle wax, board pins, stand, Bunsen burner

Method:- Fix the board pins to the metal rod with wax as shown in the figure. Fix the rod to the stand and heat the farthest end of the rod with a Bunsen burner.

Observations and conclusions:- We will notice that the board pins start falling down as the wax melts after some time.

The pins near the end that is being heated fall off first followed by the others. The pin farthest away from the end that is being heated falls off last.

→ Draw Diagram (Fig 5.1) - Conduction of heat
on Pg. no 42.

Q2:- Why are liquids and gases such poor conductors of heat?

Ans:- Liquids and gases are poor conductors of heat. Therefore, heat is not generally transmitted through them by conduction. Molecules of liquids and gases transfer heat by convection that is, their molecules carry the heat and move. They don't conduct heat.

Q3:- What is the advantage of using a copper bottom in vessels? Why are their handles made of wood?

Ans:- The advantage is that copper is a good conductor of heat and heat is easily transferred.

so food can cook fast in vessels with bottom of copper.

The handles of metal cooking vessels are made of insulators like wood, bamboo and bakelite. This is because these materials heat slowly and so are easy to hold even when the vessel is very hot.

Q4:- Explain how convection occurs.

Ans:- The process by which heat is transmitted in liquids and gases by the actual movement of molecules is called convection.

Liquids and gases are bad conductors of heat. Therefore, heat is not generally transmitted through them by conduction. When liquids and gases are heated, they expand and rise. The cooler liquid or gas moves down to take the place that was occupied by the warm liquid or gas. The cooler substance similarly gets heated up and rises. This process continues till the entire substance is heated. The continuous movement that is seen when a warm substance rises and a cooler substance settles down in its place is called a convection current.

Q5:- What causes sea and land breezes in coastal areas?

Ans:- Sea breezes and land breezes in coastal areas are actually convection currents. Water takes longer to heat than land. During the day, the land gets heated quickly and the air above it becomes warm. This warm air expands and rises, causing an

upward current. Meanwhile, since water takes longer to heat, the air above the sea remains relatively cool. This cool air flows from the sea to the land to fill in the space made by the hot air that has risen. This flow of air from sea to land is known as the sea breeze.

After sunset, the land cools quickly, but the sea takes much longer to cool and remains warm. The warm water heats the air above it, and the hot air rises. However, the land has cooled by now, and the air above it is cooler. This causes a current of air to flow from the land out to the sea. This is known as the land breeze.

→ Draw Diagram (Fig 5.7) - Sea breeze and (Fig 5.8) - Land breeze on Pg. no 45 on book.

Q6:- Why is it good to have ventilators at the top of the walls?

Ans:- It is good to have ventilators at the top of the walls because hot air rises and escapes through the ventilators near the roof. It is replaced by the cool air that comes through doors and windows. In some rooms and halls, exhaust fans near the ceiling remove the warmer air from the room to the outside.

Q7:- Draw a labelled diagram of a thermos flask. Explain how it minimises loss of heat by conduction, convection and radiation.

Ans:- The contents of the flask lose minimal heat

by conduction as glass, cork and vacuum are poor conductors of heat. The space between the double walls too is vacuum and doesn't have any liquid or gas. Therefore, there is little loss of heat due to convection. Finally, the inner walls of the glass bottle are silvered, any heat that may be radiated is reflected back into the flask.

The substance in the flask therefore retains its temperature — that is, it remains hot or cold for a long time.

→ Draw Diagram (Fig 5.16) — structure of a thermos flask on Pg. no 48.

→ Objective Type Questions:-

A. Multiple Choice Questions:-

- | | | |
|------|------|------|
| 1. a | 4. c | 7. d |
| 2. a | 5. a | 8. d |
| 3. a | 6. c | |

B. Fill in the blanks:-

- | | | |
|---------------|-------------------|---------------|
| 1. molecules | 4. Mercury | 7. radiation. |
| 2. solids | 5. doors, windows | |
| 3. Conduction | 6. dark, light | |

C. Say whether the statements are true or false.

- | | | |
|------|------|------|
| 1. T | 4. F | 7. F |
| 2. F | 5. F | 8. F |
| 3. T | 6. T | |

Topic :- Physical and Chemical Changes

Lesson no :- 6

→ Short Answer Questions:-

D. Answer in brief.

Q1:- What is an element?

Ans:- An element is a substance that cannot be split into simpler substances by chemical methods.

Q2:- Define an atom and a molecule?

Ans:- Atom:- The smallest particle of an element that retains the properties of the element is the atom.

Molecule:- A molecule is the smallest particle of an element or a compound that can exist by itself.

Q3:- What is the formula of nitric acid? Name the atoms present in one molecule of nitric acid.

Ans:- The formula of nitric acid is HNO_3 . The atoms present in one molecule of nitric acid are Hydrogen, Nitrogen and Oxygen.

Q4:- Compound A reacts with another compound B to form a compound C. What kind of change does this represent?

Ans:- This represents chemical change.

Q5:- What compounds do these formulae represent?

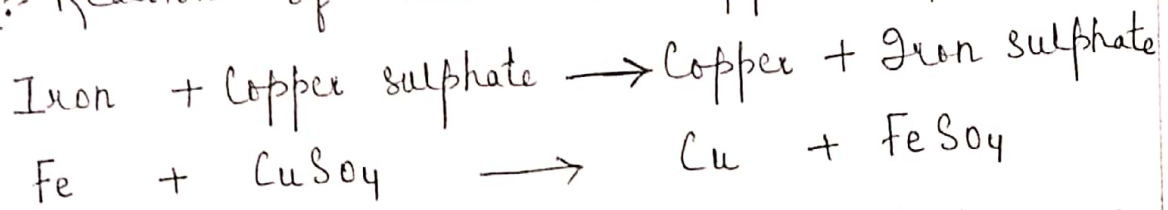
Ans:- $\text{H}_2\text{O} \rightarrow$ Water $\text{CuSO}_4 \rightarrow$ Copper sulphate
 $\text{CO}_2 \rightarrow$ Carbon dioxide $\text{NaHCO}_3 \rightarrow$ Sodium bicarbonate

Q6:- What is crystallisation? What is it used for?

Ans:- Crystallisation is the process of separating a solid from its solution as crystals. It is an example of a physical change and is used to get pure crystals of certain substances.

Q7:- Write the chemical equation in words, and then using chemical formulae, for the chemical change that occurs when iron nails are dipped in copper sulphate solution.

Ans:- Reaction of Iron and Copper Sulphate:-



Q8:- How can browning of the cut surfaces of some fruits and vegetables be prevented?

Ans:- The browning of cut fruits and vegetables can be prevented by rubbing lemon juice on the cut surfaces or by placing the cut fruits or vegetables under water to prevent contact with oxygen.

→ Long Answer Questions:-

E. Answer in detail.

Q1:- Explain with the help of examples, the difference between an atom and a molecule.

<u>Ans:-</u> Atom	Molecule.
1. The smallest particle of an element that retains the properties of the element is	1. A molecule is the smallest part of an element or compound that can exist by itself.

called an atom

2. Each element is made up of only one kind of atom. A piece of gold is made of only gold atoms. The atoms of one element are different from the atoms of any other element.

3. For example, the atoms of oxygen are different from the atoms of nitrogen. But all atoms of oxygen are chemically identical and all atoms of nitrogen are chemically identical.

2. A molecule may contain one or more atoms, which may be similar or dissimilar.

A molecule of an element contains similar atoms, whereas a molecule of a compound contains dissimilar atoms.

3. For example, a molecule of nitrogen has two atoms of nitrogen, a molecule of phosphorus has four atoms of phosphorus.

Q2:- List three main properties of all compounds.

Ans:- The three main properties of all compounds are:-

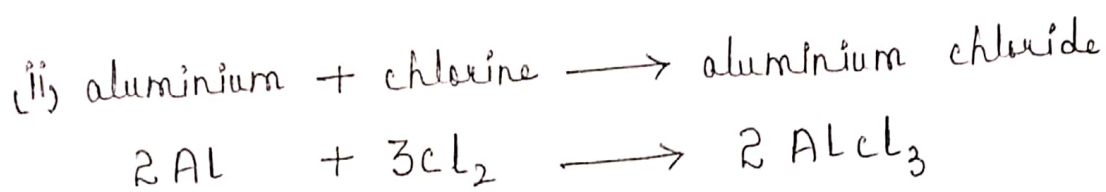
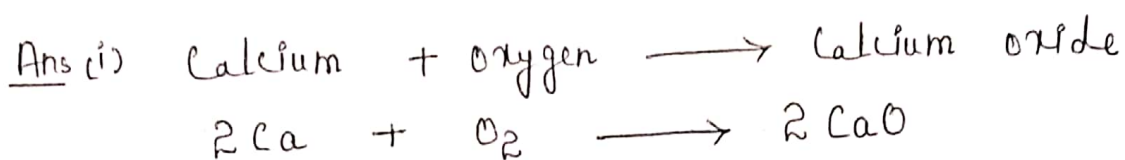
1. Composition:- The composition of a specific compound is fixed irrespective of how and where it is made.

2. Separation:- A compound cannot be broken down to its constituent elements by physical methods of separation. However, it can be separated by chemical methods.

3:- Properties different from Constituent Elements:- The properties of compounds are different from the properties

of their constituent elements. For example, hydrogen is an explosive gas and oxygen is a gas that helps in combustion. But water, the compound formed by the combination of hydrogen and oxygen, is a liquid that helps extinguish fires.

Q3:- Write balanced equations for the following chemical reactions:-



Q4:- Define a physical change and list its characteristics. Give three examples of physical changes.

Ans:- Changes that affect only the physical properties of a substance and where no new substances are formed are called physical changes.

Characteristics of Physical Changes

1. A physical change affects only the physical properties of a substance, such as size, shape and state.
2. No new substance is formed in a physical change.
3. The substance after the change and the substance before the change are the same chemically.
4. A physical change can be either reversible or irreversible.

The three examples of physical changes are:-

1. Melting of butter.
2. Tearing of paper
3. Breaking of glass.

Q5:- Describe an experiment to get crystals of alum.

Ans:- Aim:- To make alum crystals from alum solution.

Materials required:- beaker, water, alum powder, Bunsen burner, thread, glass rod, tripod stand, Petri dish.

Method:-

1. Take 200 ml of water in a beaker, add alum powder and prepare the solution by stirring the contents of the beaker until most of the alum dissolves and some is left undissolved.
2. Heat the solution over a Bunsen burner. Mix till the undissolved alum has also dissolved.
3. Stop heating the solution and let it cool. As the solution cools, it becomes supersaturated and alum crystals start forming in the beaker.
4. Carefully pick out one crystal of alum and place it on a Petri dish. Tie one end of a piece of thread around the alum crystal at one end carefully.
5. Heat the alum solution again and dissolve all the alum.
6. Tie the thread with the crystal at one end to a pencil or a glass rod.
7. Place the rod over the beaker with the

suspended crystal in the solution. Leave the beaker undisturbed for a few days.

Observations and Conclusions:- The small alum crystal suspended in the solution acts as a base on which a larger crystal is formed. We can also make crystals of other substances such as urea and copper sulphate using the same method.

Q6:- Define a chemical change and list its characteristics. Give three examples of chemical changes.

Ans:- Changes that involve the formation of new substances are called chemical changes.

Characteristics of Chemical Change

1. There may be a change in colour.
2. Evolution of a gas or effervescence may be observed.
3. A precipitate may be formed.
4. Heat may be given out or absorbed.

The three examples of chemical changes are burning of paper, curdling of milk and cooking of food.

Q7:- What is rusting of iron? How can it be prevented?

Ans:- Rust is actually iron oxide formed by the reaction of iron with atmospheric oxygen in the presence of moisture. The rusting of iron is, therefore, a chemical change.

Rusting can be prevented by coating the iron surface with oil, grease or paint. This

layer prevents iron from coming in contact with air and moisture.

Another method of preventing rusting is to coat the iron with another metal such as zinc or chromium. The process of depositing a layer of zinc on iron is called galvanisation.

Q.: Describe an experiment to prove that water and air are needed for rusting to occur.

Ans:- Aim:- To observe air and water are required for the rusting of iron.

Materials required:- conical flask, stopper, spirit lamp, stand, beaker, muslin cloth, iron nails or common iron pins, water.

Method:-

1. Fill a conical flask almost completely with water, upto about 3cm from the top.
2. Heat it with the spirit lamp. let the water boil for one or two minutes so that the air dissolved in the water is expelled.
3. Put half of the iron nails into the flask.
4. Place the rest of the nails on a muslin cloth. Secure them in a knot and wet the cloth. Dip the other end of the cloth in water so that the cloth remains wet.
5. Leave the setup for one or two days, making sure that the cloth doesnot become dry.
6. Inspect the nails inside the flask and those inside the moist cloth.

Observations and Conclusions: We will observe that the nails inside the flask do not rust, whereas those in the moist cloth do. This shows that the rusting of iron requires both air (oxygen) and water.

Rusting is a chemical reaction between iron and oxygen that occurs in the presence of water.



→ Draw Diagram (Fig 6.7) - Rusting of Iron nails on Pg. no 63.

Q9:- Explain with an experiment what happens when iron nails are dropped into a solution of copper sulphate.

Ans:- Aim:- To study the reaction of iron with copper sulphate.

Materials required:- copper sulphate, water, glass rod, iron nails, sandpaper, test tube

Method:-

1. Take about 100 ml water in a test tube and add some copper sulphate to it. Dissolve the salt by stirring the solution with a glass rod. Observe the colour of the solution.
2. Clean the iron nails thoroughly with sandpaper. Record their colour.
3. Now, drop the iron nails in the copper sulphate solution and leave them undisturbed overnight.
4. Take the iron nails out the next day and

observe the colour of the iron nails and the solution.
Observations and Conclusions:- We will see that the colour of the solution has changed from blue to green. Some iron from the iron nails reacts with copper sulphate in the solution and forms a new substance, iron sulphate, which is green in colour. Since this change involves the formation of new substances, it is a chemical change.

→ Objective Type Questions:-

A. Multiple Choice Questions.

- | | | | |
|------|------|------|-------|
| 1. b | 4. d | 7. d | 10. c |
| 2. d | 5. d | 8. c | |
| 3. c | 6. d | 9. c | |

B. Fill in the blanks.

- | | |
|---------------------|--------------------|
| 1. 118 | 5. Crystallisation |
| 2. sodium, chlorine | 6. chemical |
| 3. elements | 7. calor |
| 4. physical | 8. copper sulphate |

C. Say whether the statements are true or false.

- | | | |
|------|------|-------|
| 1. T | 5. T | 9. T |
| 2. T | 6. F | 10. F |
| 3. F | 7. T | |
| 4. T | 8. F | |