14. Measurement and Effects of Heat

Practice Questions

Q 1) Short notes on the following.

1. Sun

Ans: The Sun is the biggest source of heat received by the earth. A large amount of heat is generated due to the nuclear fusion taking place in its centre. In this process hydrogen nuclei fuse together to form helium nuclei, generating heat in the process. Some part of heat reaches the earth in the form of light and heat.

2. Specific heat

Ans: The amount of heat required to increase the temperature of unit mass of that substance through 1°C is called as specific heat or specific thermal capacity. Specific thermal capacity is the property/characterisitic of the substance. The water has the highest specific heat or specific thermal capacity. The SI unit of specific heat is Joule/ (kg °C)and CGS unit is Cal/ (gm °C).

3. Temperature

Ans: We can find out if the object is hot or cold by touching the object. However, our sense of 'hot' or 'cold' is relative. We cannot determine the temperature of an object accurately simply by touching it. Temperature is

measured by a thermometer. Temperature is measured in Celsius, Fahrenheit, Kelvin and Rankine units.

4. Celsius/ centigrade method

Ans: The Swedish scientist Anders Celsius invented Celsius method. He created one scale and divided 0 º to 100 ºC into a hundred parts. The temperature of an object is expressed in degree Celsius (ºC). 0ºC is freezing point and 100ºC is boiling point of the water.

5. Fahrenheit method

Ans: Daniel Gabriel Fahrenheit invented the Fahrenheit method. In the measurement method, 32ºF is the minimum temperature and 212ºF is maximum temperature. The temperature of object is expressed in degree Fahrenheit (ºF).

6. Simple thermometer

Ans: The temperature is measured with the help of thermometer. It has a temperature sensor means liquid metal like mercury is filled in circular area like a bulb at the bottom. The physical changes occur in mercury according to the temperature and its level increases or decreases accordingly. The level of the mercury in thermometer is called as the temperature of that object. Mercury is a liquid as well as glitter metal. The freezing

point of mercury is -39°C so it cannot be used for the measurement of temperature below it.

Q. 2) Write reasons

1) Now digital thermometer is used in medical treatment.

Ans: 1) The expansion of liquid that occurs due to heat is not used to measure temperature. 2) Instead, it has a sensor which can measure the heat coming out from the body directly and from that we can measure the temperature of the body. Therefore, now digital thermometer is used in medical treatment.

2) Do not measure the temperature by touch.

Ans: We cannot determine the temperature of an object accurately by simply touching it. Also you may hurt yourself by touching very hot or cold objects. Therefore, do not measure the temperature by touch.

Question. 3) Write the answers of the following questions.

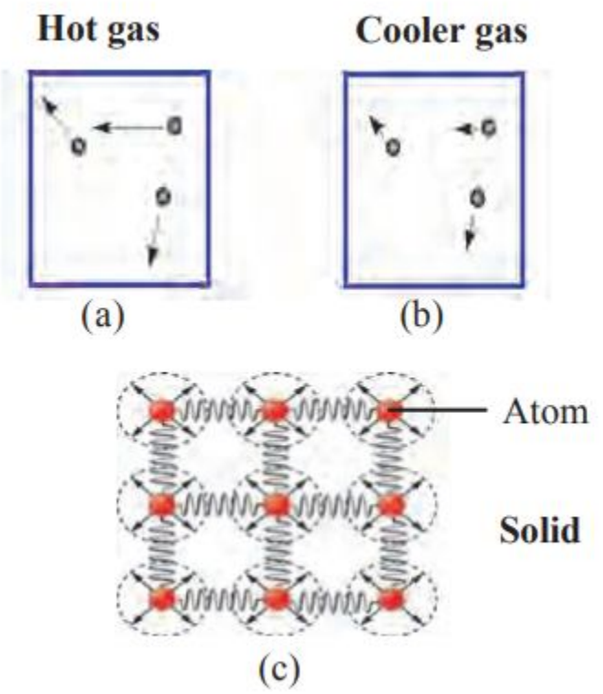
1) Explain the composition of thermometer with the help of diagram.

Ans: Thermometer

A thermometer has a narrow glass tube which has a bulb at one end. The bulb and part of the tube is filled with a liquid. Earlier, mercury was filled in the tube but, as it is harmful for us, it has been replaced with alcohol. The rest of the volume of the tube has vacuum and its other end is closed. The bulb is kept in contact with the object whose temperature is to be measured so that its temperature becomes same as that of the object. Because of the increased temperature the alcohol inside it expands and its level in the tube rises. Using the properties of the expansion of alcohol, the temperature can be obtained from the level of the alcohol in the tube. The tube of the thermometer is marked accordingly.

2) Explain the difference between heat and temperature with the help of diagram.

Ans: Diagrams-



A substance is made of atoms. The atoms in a substance are always in motion. The total kinetic energy of the atoms in a substance is a measure of the heat contained in that substance, while the temperature of a substance is related to the average kinetic energy of atoms. If the average kinetic energy of atoms in two objects is equal then their temperatures will also be equal.

Figure 'a' and 'b' show the velocities of atoms in a gas at high and low temperature, respectively. The direction and the length of the arrows attached to the atoms show the direction and magnitude of the velocity of the atoms. The velocity of atoms in the gas at higher temperature is larger than the velocity of atoms in the gas at lower temperature. The velocities of atoms in a solid object are shown by arrows in figure 'c'. The atoms in a solid object are tied to one another because of the forces acting

between them. So they cannot be displaced from their places. Because of heat, they oscillate around their fixed position. Higher the temperature of the solid, faster is their velocity of oscillation.

Question. 4) Write whether the following statements are true or false.

1) The calorimeter is made of iron.

Ans: False – The calorimeter is made of copper.

2) 0ºC is the freezing point of water.

Ans: True

3) The Sun is the biggest source of heat received by the earth.

Ans: True

4) The nucleus of atom is divided andintense heat is generated.

Ans: True

Question. 5) Define the following.

1) One calorie energy

Ans: The heat energy required to raise the temperature of one gram water by 1ºC is called as one calorie heat.

2) Temperature

Ans: The heat level or heat ratio of a substance is its temperature.

3) Geothermal energy

Ans: The heat at the centre of the earth is called as geothermal energy.

4) Melting point

Ans: The temperature at which a solid substance changes into liquid state is called as melting point of that substance.

5) Freezing point

Ans: The temperature at which a liquid substance changes into solid state is called as freezing point of that substance.

6) Evaporation

Ans: At normal temperature, the process of conversion of solid substance to gaseous form at temperature lower than boiling point is called as evaporation.

Question. 6) Write the answers in one sentence.

1) What is constant pressure expansion?

Ans: The expansion of a gas is measured by keeping its pressure constant. This volumetric expansion coefficient is called the constant pressure expansion.

2) What is Areal expansion of solids?

Ans: Similar to linear expansion, the area of a sheet of a solid material also increases on heating. This is called the areal expansion of solids.

3) Volumetric expansion of solids

Ans: A three dimensional piece of solid expands on all sides when heated and its volume increases. This is called the volumetric expansion of solid.

4) Which energy is obtained from wood?

Ans: Chemical energy is obtained from wood.

5) What is used to measure the temperature of the human body?

Ans: Clinical thermometer is used to measure the temperature of the human body.

6) Which are the equipments which produce heat with the help of electricity?

Ans: The electric heater, electric press are the equipments which produce heat with the help of electricity.

7) A calorimeter is used for what?

Ans: A calorimeter is used to measure the heat content of an object.

8) What are the uses of Alcohol thermometer?

Ans: Alcohol thermometer is used to measure extremely low temperatures.

9) What is anomalous behaviour of water?

Ans: The effect of heat on water is somewhat different from that for other liquids. This is called anomalous behaviour of water.

10) According to clinical thermometer, how much is the temperature of our body?

Ans: According to clinical thermometer, the temperature of our body is 98.4°F.

Question. 7) Identify the different term.

1) Celsius, Fahrenheit, Calorie, Kelvin

Ans: Calorie (Others are the unit of temperature.)

Question. 8) Identify the correlation.

1) _____: Geothermal energy: : Electric heater: Electrical energy

Ans: Earth

2) σ: Sigma: : λ : _____

Ans: Lambda