

Chapter 6. Combustion and Flame class 8 living science solution

A. Formative and Summative Assessment

1. Good fuels have

- a. low ignition temperature and high calorific value. b. low ignition temperature and low calorific value.
c. high ignition temperature and high calorific value. d. high ignition temperature and low calorific value.

2. Calorific value of a fuel is the heat energy produced when

- a. any amount of the fuel is completely burnt. b. one kilogram of the fuel is completely burnt.
c. one milligram of the fuel is completely burnt. d. hundred grams of the fuel are completely burnt.

3. Which poisonous gas is formed as a result of incomplete combustion?

- a. coal gas b. carbon monoxide c. carbon dioxide d. nitrogen oxide

4. Acid rain can be caused by the burning of a. petrol. b. CNG. c. diesel. d. coal

5. To extinguish a flame, which of these methods can be used?

- a. reduce temperature to below ignition temperature b. remove combustible substance
c. cut of air supply d. any one of these

6. The hottest zone of a candle flame is

- a. non-luminous zone. b. luminous zone. c. dark zone. d. blue zone at the base of the wick

7. Which of these is a solid pollutant?

- a. SPM b. carbon monoxide c. nitrogen oxides d. sulphur dioxide

8. Which of these fuels has the highest calorific value?

- a. CNG b. coal c. hydrogen d. petrol

Answer: 1. a 2. b 3. b 4. d 5. d 6. a 7. a 8. c

B. VERY SHORT-ANSWER QUESTIONS: Give one-word answers.

1. What is the process of burning of substances with the evolution of heat and light called. _____

2. Most fuels are made up of ___ and _____.

3. Which gas is produced when a fuel burns in a. sufficient supply of air b. insufficient supply of air.

4. All combustible substances must be heated to the same temperature to make them True or false?

5. Am. substance that can burn is an inflammable substance. True or false?

6. Spontaneous combustion starts at room temperature. True or false?

7. During an explosion, a large amount of _____ is given out .

8. -Water is useful in putting out all fires. True or false?

9. In a soda-acid type fire extinguisher, _____ reacts with sulphuric acid to give out carbon dioxide.

10. The _____ zone in a candle flame is the zone of no combustion.

11. The amount of heat liberated when one kilogram of a fuel is completely burnt in sufficient supply of oxygen is called _____ of the fuel.

12. Name one unit in which the heat liberated by a fuel is measured.

13. The lower the ignition temperature the better the fuel. True or false?

14. What are the fine particles released on burning carbon-containing fuels called?

Ans: 1. Combustion 2. Hydrogen, carbon 3. a. Carbon dioxide b. Carbon monoxide

4. False 5. False 6. False 7. gas 8. False 9. sodium bicarbonate

10. dark 11. Calorific value 12. joule 13. True 14. SPM

C. SHORT-ANSWER QUESTIONS (TYPE I): Answer in a sentence or two.

1. What is combustion?

Ans: The process of burning of substances in air or oxygen with the evolution of heat and light is known as combustion.

2. Distinguish between combustible and non-combustible substances, giving three examples of each

Ans: Combustible substances : A substance that burns in air or oxygen to produce heat and light is called a combustible substance. Examples: Paper, wood, kerosene, LPG.

Non-combustible substances A substance that does not burn in air or oxygen is called a non-combustible substance.

Examples: Stone, sand, soil.

3. Why is it more difficult to burn some combustible substances than others?

Ans: It is more difficult to burn some combustible substances than others because they have different ignition temperatures.

For example, a log of wood has higher ignition temperature than cut pieces of wood.

4. State the conditions under which combustion occurs.

Ans: The conditions under which combustion occurs are:

(i) Presence of a combustible substance. (ii) Presence of O₂ (supporter of combustion)

(iii) Heating to its ignition temperature.

5. Why is more care needed to store kerosene than coal, though both are fuels?

Ans: More care is needed to store kerosene than coal, though both are fuels because kerosene is an inflammable substance and has much lower ignition temperature than coal and hence can catch fire easily.

6. What problem will arise if a fuel has an ignition temperature lower than the average room temperature? Name the type of combustion that will occur in such a case.

Ans: If a fuel has an ignition temperature lower than the average room temperature then it catches fire rapidly without application of external heat. For example white phosphorus is stored under water and sodium is stored under kerosene to avoid spontaneous combustion.

7. What is an explosion?

Ans: A combustion reaction in which sound is produced along with evolution of heat, light, and a large amount of gas is called an explosion. Example: Firecracker.

8. Why is water not suitable for extinguishing a fire in an electrical appliance?

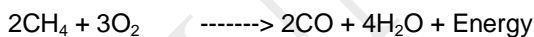
Ans: Fire in electrical equipments cannot be controlled with water as water is good conductor of electric current and a person trying to extinguish the fire can get an electric shock.

D. SHORT-ANSWER QUESTIONS (TYPE II): Answer in about 30 words.

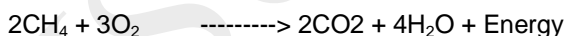
1. Name and give chemical equations to show the products of the combustion reaction in

a. a limited supply of air. b. sufficient supply of air.

Ans: (a) Combustion reaction in limited supply of air causes incomplete combustion produce carbon monoxide, water and energy.



(b) Combustion reaction in sufficient supply of air causes complete combustion produce carbon dioxide and water and energy



2. List the different methods by which a fire can be extinguished.

Ans: A fire can be extinguished by applying different methods.

(a) Removing the combustible substance.

(b) Cooling the substance to below its ignition temperature using water .

(c) Cutting off the supply of air or using fire extinguishers.

3. What kind of fires can effectively be put out by water? What kind of fires is it not suitable for? Give reasons for both cases.

Ans: When wood or paper are on fire, water can be used to put out the fire effectively. As these substances are solids, heavier than water and not fuels by nature, they can be extinguished by water easily.

Water is not suitable to use as extinguisher on the fire caused by electricity as water conducts electricity. Also, oil or petrol fires cannot be put out by water as oil and petrol are lighter than water. They float on water and keep burning.

4. How does carbon dioxide extinguish a fire?

Ans: Carbon dioxide being heavier than air forms a blanket around the fire cutting off the air supply. Also CO₂ is not a supporter of combustion.

5. What is calorific value of a fuel? Why is hydrogen not used as a fuel though it has highest calorific value?

Ans: Calorific value : The amount of heat produced on complete combustion of one kilogram of the fuel is called Calorific value of fuel.

Hydrogen is not used as a fuel because it has very low ignition temperature and highly explosive nature .

6. How are fuels classified on the basis of their physical state? Give two examples of each

Ans: Fuels can be classified on the basis of their physical state as solid, liquid and gas.

Solid fuels: wood, coal, cattle-dung cakes, (ii) Liquid fuels: kerosene, LPG , petrol, diesel

(iii) Gaseous fuels: CNG, coal gas, water gas, producer gas

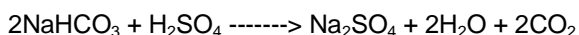
7. How is burning of fossil fuels thought to be related to global warming?

Ans: Combustion of fossil fuels adds carbon dioxide and carbon mono oxide in to air. This trap the sunlight and increase the average temperature of atmosphere called the greenhouse effect and cause global warming. Global warming melts ice caps that causes flood.

E. LONG-ANSWER QUESTIONS: Answer in about 60 words.

1. Explain, with the help of a labelled diagram.

Ans: The simple fire extinguisher is the soda-acid type fire extinguisher. In this fire extinguisher Sulphuric acid and react with Sodium bicarbonate to liberate carbon dioxide. As the gas carbon dioxide is evolved with brisk effervescence, form layer around fire and cut off the supply of oxygen to extinguish fire .



2. How a soda-acid type fire extinguisher works. Name the different zones of a candle flame. Give details of the conditions in each zone.

Ans: Candle flame: Light a candle and observe its flame. The flame has three main zones depending on the amount of air it receives. The zones have different colours.

(i) Non-luminous zone or the zone of complete combustion is the hottest part of the candle flame. Because of adequate supply of oxygen, complete combustion occurs. Therefore, no residue is left on an object placed in this zone. The flame appears blue. It is the outermost zone of the flame.

(ii) Luminous zone or the zone of incomplete combustion is moderately hot. The wax vapours do not burn completely as the supply of oxygen is inadequate. It leaves a black soot and other residues on an object placed here. The carbon particles glow emitting a yellow light. It is the middle zone of the flame.

(iii) Dark zone or the zone of no combustion is the least hot. It covers the area surrounding the wick containing unburnt vapours produced by the melting of wax. Here the wax vapours do not come in contact with oxygen, hence do not burn. It is the innermost zone of the flame.

3. What are the characteristics of a good fuel?

Ans: Characteristics of a good fuel:

- (i) Having low ignition temperature,
- (ii) Having high calorific value
- (iii) Cheap, Easy to store, transport and use
- (iv) Eco friendly and does not cause pollution,
- (vi) Leaves no soot

Coal, petroleum and natural gas nearly meet all these conditions.

4. Discuss the impact of burning fuels on air.

Ans: The main impacts due to burning of fuels are as follows:

(i) Burning of carbon-containing fuels releases ash and fine particles of unburnt carbon in the air.

(ii) Combustion of fuels adds carbon dioxide to the environment. A percentage increase in carbon dioxide in the air leads to the greenhouse effect which can cause global warming.

(iii) Carbon monoxide produced when fuels containing carbon burn in insufficient supply of air, is a very dangerous pollutant and can cause death if breathed in.

(iv) Coal contains sulphur, which produces sulphur dioxide on burning. This gives rise to acid rain, which is very harmful for soil, crops, buildings, etc.

(v) Lead compounds are released in exhausts of vehicles. They are poisonous.

HOTS Questions

1. Only gases burn with a flame. But when you burn wood, it initially burns with a flame. Later, it only glows without a flame. What do You think is the reason for this?

Ans: When wood is burnt, initially the gases trapped in it are released. These gases burn with a flame. Once the gases are exhausted, the wood only glows and does not burn with a flame.

2. Would you consider coal as a good fuel? Give reasons.

Ans: While coal has many necessary attributes that a good fuel should have, its major drawbacks are that it causes air pollution and leaves behind residue (ash).

Therefore in the existing situation, where pollution is a major worry, it will be better not to use it in its natural form but to convert it into coke.

3. When a fuel is burnt, carbon dioxide (or carbon monoxide) and water vapour are given out. Can you name one fuel which burns without giving off water vapour? Why does it not give out water?

Ans: Hydrocarbon fuels give off water vapour when burnt due to the presence of hydrogen in them. Coal and coke, which are carbon and not hydrocarbons, will not give off water vapour when burnt.

4. Why does a matchstick burn on rubbing it on the side of the matchbox?

Ans: When a matchstick is rubbed on the side of a matchbox, heat is given off due to friction with the rough surface. The ignition temperature of the material used in matchsticks is low enough to catch fire because of this heat.

5. Your LPG gas stove at home is giving a yellow flame. What can this mean?

Ans: The LPG gas stove gives a yellow flame due to incomplete combustion of the gas. This can be due to blockage of burner holes, or improper adjustment of the air-gas mixture.

6. A flame always points upwards. Why do you think this is so? (ENT: Gases produced in a flame are hot, and hence lighter.)

Ans: Gases produced in a flame are hot, hence lighter. Therefore they rise up. That is why the flame always points upwards.

7. When a candle burns, is it possible to get the wax back a. after the wax melts? b. after the wax burns? (IINT: Are these physical changes or chemical changes?)

Ans: (a) After the wax melts, it is possible to get the wax back because it is a physical change. (b) After the wax burns, it is not possible to get the wax back because it is a chemical change.

8. Why do we wrap a blanket around a person whose clothes have caught fire?

Ans: We wrap a blanket around a person whose clothes have caught fire to cut off the supply of oxygen which eventually extinguishes the fire. However, the blanket must be removed immediately after the fire is extinguished so that the body can cool. Otherwise it will lead to severe burns.

9. Why do forest fires occur during hot summers?

Ans: During hot summers, the temperature is high, the air has less water vapour, and there is lots of dry vegetation in the forest. All these conditions are favourable for a fire, started by friction between trees, becoming a major forest fire.

10. Why is it easier to burn dry leaves but not green leaves?

Ans: It is easier to burn dry leaves but not green leaves as green leaves contain water whereas dry leaves do not.