



CHAPTER: COAL AND PETROLEUM

Grade: 8

Board: **CBSE**

Book: **NCERT**



1.

CHAPTER SUMMARY AND PLACEMENT

<Read through the following to understand how this chapter is connected with the previous and next grades and also the important concepts covered in it.>



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1. Coal and Petroleum is being introduced to students for the first time. This chapter in grade 8 lays foundation for the stem of chemistry chapters in the senior years. In further grades it evolves into Carbon and it's Compound in grade 10.
 2. This chapter introduces the terms like fossil fuels, natural resources etc. The chapter discuss the origin and occurrence of different type of fossil fuel. It distinguish between different types of natural resources and classify them into different type. It also deals with various types of coal and the process of destructive distillation of coal. The chapter ends with listing ways to conserve fossil fuel and energy. Clarity of these concepts will strengthen student's concepts for further learning in chemistry.
 3. Since the central idea of the chapter is discussing various type of fossil fuel and their byproducts. It also focus on conserving fossil fuel and energy.



2.

LEARNING OUTCOMES

<On completion of the chapter, students will be able to:>



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- 
1. Identify natural resources
 2. Differentiate between exhaustible and inexhaustible natural resources
 3. Define fossil fuel
 4. Trace the origin and occurrence of different fossil fuel
 5. Classify coal into its types
 6. Explain the destructive distillation of coal
 7. Describe the refining of petroleum
 8. Recognize natural gas as a fossil fuel
 9. List different uses of fossil fuel
 10. State ways to conserve fossil fuel and energy



3. KEYWORDS

Definitions of some terms used in the chapter:





Exhaust: used up

Inexhaustible natural resources: are those which are found in abundance

Exhaustible natural resources: are those resources which get exhausted after continuous use

Fuel: is a substance that produces energy on burning

Fossil: dead remains of plants and animals of the past





3. TEACHING PLAN

Follow this section for getting ideas on teaching the content covered in the chapter. The subtopic given in the first column with the matching learning outcome can be explained using instructions and resources listed subsequently



Subtopic and Learning Objective #1

Natural Resources

1. Identify natural resources
2. Differentiate between exhaustible and inexhaustible natural resources

Teacher Activity

1. Ask students to share names of things which we directly get from nature.
2. Appreciate all responses.
3. Write all the names on board.
4. Tell students that these are known as natural resources as they are obtained from nature.
5. Now ask students to share names of some resources which are man-made, write them on board.
6. Ask students to classify the listed natural resources on board into those which will last forever and that will finish soon.
7. Draw a table and categorize the resources into two category. Add any missing and clarify the doubts.
8. Conclude by saying that those resources which are not likely to exhaust/finish are known as inexhaustible and the other which get finish if continuously used is known as exhaustible resources.

Check for understanding:

- a. Write names of three exhaustible fuel.
- b. Define natural resources and classify them into two types.

Resources Suggested

Blackboard, Textbook

Subtopic and Learning Objective #2

Fossil Fuel

1. Define fossil fuel
2. Trace the origin and occurrence of different fossil fuel

Teacher Activity

1. Show students different types of fuel like wood, cow dung cake, petrol, coal, diesel etc.
2. Ask students what is common in them.
3. Prompt them to think that all these are domestic fuels.
4. Ask students can they name some other fuels that are stored in cylinders.
5. Conclude by saying that CNG and LPG are other fuels.
6. Inform students that these are known as fossil fuel.
7. Ask students can anyone guess the meaning of fossil fuel.
8. Tell students that a fuel formed from the remains of dead plants and animals that got buried under the earth millions of years ago are called fossil fuel.
9. Ask students is fossil fuel exhaustible or inexhaustible. Tell that they are exhaustible because they take millions of years to form.
10. Ask students to guess the formation of fossil fuel.
11. Discuss the formation of coal from the coal story given in book.
12. Also discuss about the formation of petroleum.

Check your Understanding

- a. Name some fossil fuel.
- b. Write the story of coal formation.

Resources Suggested

petrol, coal, diesel

Subtopic and Learning Objective #3

Coal

Classify coal into its types

Explain the destructive distillation of coal

Teacher Activity

1. Show coal to all the students.
2. Ask them to describe the appearance of coal.
3. Tell students that it is a black colour solid that look like stone.

4. Inform students that coal is of four types. These are lignite, subbituminous, bituminous and anthracite.

Anthracite	Bituminous	Subbituminous	Lignite
Found deep inside the Earth	Found at a moderate depth	Found above bituminous coal	Found close to the earth surface
Black and hard coal	Black and less hard coal	Less black and soft coal	Brown and soft coal
High carbon content	Moderate carbon content	Mild carbon content	Very less carbon content
Produce large amount of energy on burning	Produce moderate amount of energy on burning	Produce very less amount of energy	Least amount of energy released
Very less impurity and moisture			High impurity and more moisture
Do not leaves residue on burning			Leaves residue on burning

5. Tell students that the best coal is found deep inside the earth crust because it is formed first while the low grade coal is found near the surface of the earth because it is formed recently.
6. Show students the picture of destructive distillation apparatus. Tell them that coal is heated in it in absence of air, which produces by-products like coke, coal tar, coal gas, ammonium compound etc.
7. Show them the picture of each by-product.
8. Discuss the characteristics of them.

Check for understanding:

- a. Which by-product is known as town gas?
- b. Give two uses of coke and coal tar.

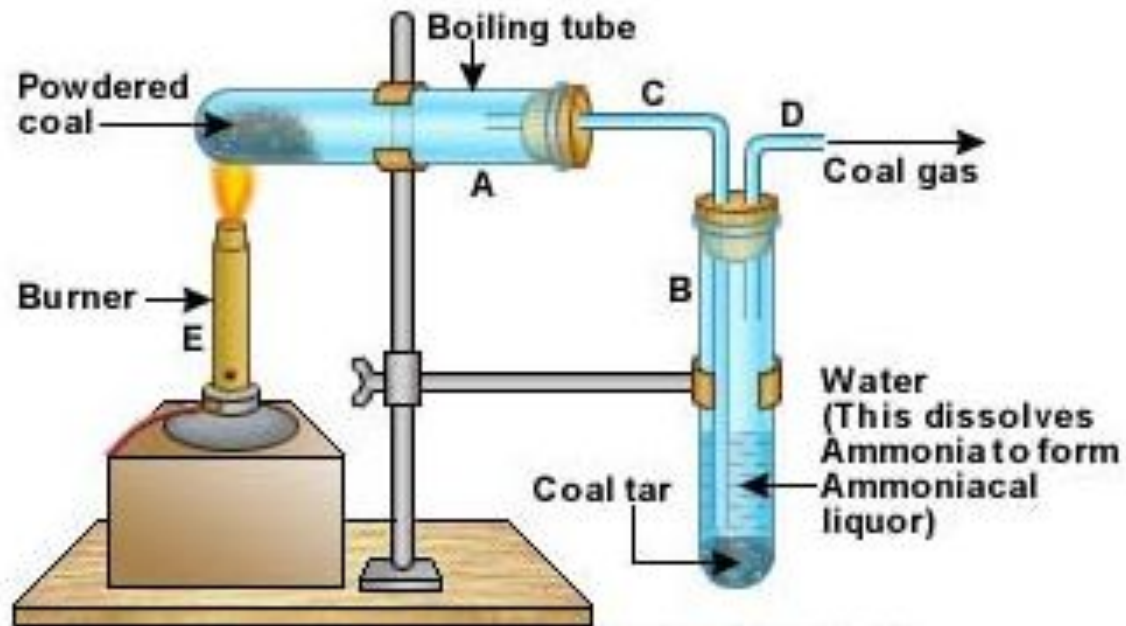
Resources Suggested

Resource 1

Resource 1:

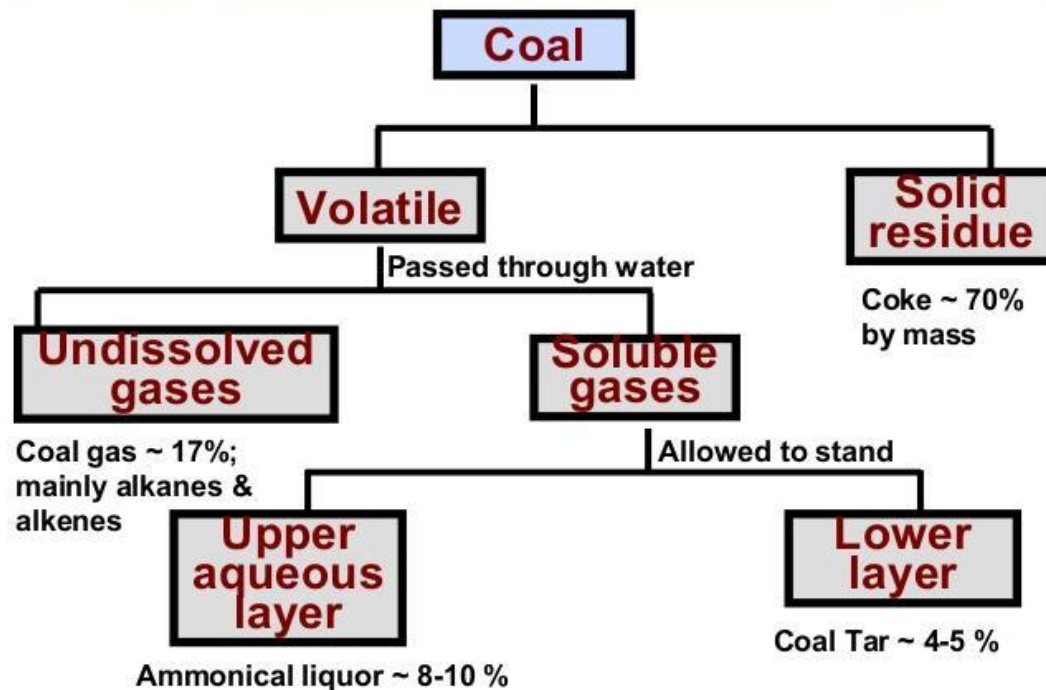
Types of coal





Destructive distillation of coal

Destructive Distillation of Coal



Products of Destructive distillation of coal:

Subtopic and Learning Objective #4

Petroleum

Describe the refining of petroleum

Teacher Activity

1. Show students the picture of petroleum refinery.
2. Ask students to guess it.
3. Conclude by saying that it is petroleum refinery. It is a place where petroleum is separated into its constituent substances.
4. With the help of picture discuss fractional distillation of petroleum.
5. Discuss that petroleum is heated to about 400°C in a furnace. The vapours are pass through tall fractionating column. As the vapours rise in the column, the fractions get condensed at different temperatures and are thus separated. The fraction with the highest boiling point condenses first. It is collected near the base of the fractionating column. The fractions with lower boiling points condense near the top of the column. The gaseous fraction escapes from the top of the column.

Table 7.2 Products of petroleum refining

Fraction	Boiling range	Use(s)
Petroleum gas	Below 40°C	Domestic fuel (LPG)
Petrol	40–170°C	Automobile fuel
Kerosene	170–250°C	Domestic fuel
Diesel	250–350°C	Fuel for automobiles, locomotives, generators, pumps, and agricultural machinery
Fuel oil	350–400°C	Fuel for ships and industries
Lubricating oil	Above 400°C	Lubricating machines
Paraffin wax		Making candles, pomades and grease
Asphalt		Surfacing roads

7. Tell students that asphalt is separated first at the bottom of the column while petroleum gas is separated at the top of the column as it has least boiling point. Also tell that with increase in height the boiling point decreases and gases substances are release at the top.
8. Fractionate which is release at the top has less amount of carbon in it than fractionate which is release at the bottom.

Check for understanding:

- a. Write the chemical equation for rusting
- b. State three conditions for rusting.

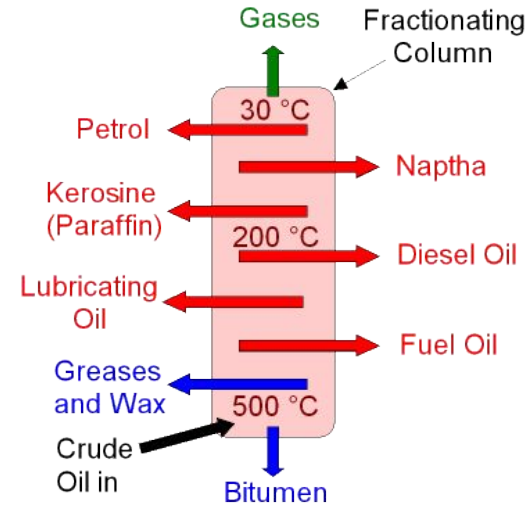
Resources Suggested

Resource 2

Resource 2:



Petroleum Refinery



Fractional Distillation of Petroleum

Subtopic and Learning Objective #5

Natural gas

Recognize natural gas as a fossil fuel

List different uses of fossil fuel

Teacher Activity

1. Ask students to share what they know about natural gases.
2. Tell students that natural gas is a fossil fuel. It is colorless and odorless consisting mainly of methane.
3. Discuss the benefit of natural gas against other fossil fuel.
4. Ask students to share different uses of fossil fuel.
5. Ask students to write different ways to conserve fossil fuel. Which they will discuss in their next class.

Check for understanding:

- a. Define natural gas.
- b. Write two uses of natural gas.

Resources Suggested

Blackboard and chalk

Subtopic and Learning Objective #6

Ways to conserves

State ways to conserve fossil fuel and energy

Teacher Activity

1. Ask students to share their previous class homework.
2. Add any missing point on how to conserve fossil fuel and energy.
3. Also tell students that they should follow this in their daily life.

Check for understanding:

- a. Write ways to conserve fossil fuel.

Resources Suggested

Blackboard and chalk



4. WORKSHEETS

Print or copy the worksheet questions on the blackboard and ask the students to attempt them. They can be given as homework or a class test as well.

Worksheet 1

Use it like: test after the chapter is complete, homework

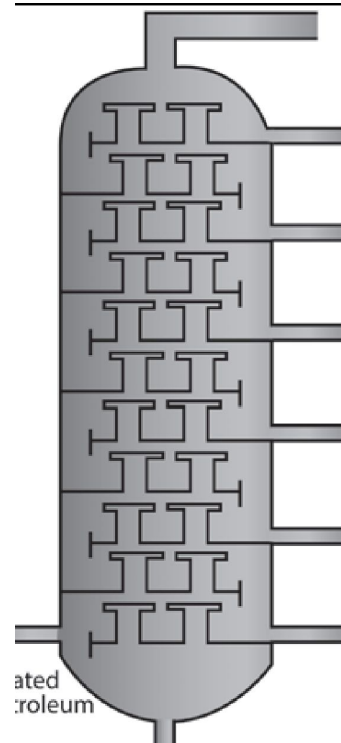
Answer the following questions in brief:

1. Define natural resources. Classify them with examples.
2. State ways to conserve energy/natural resources.
3. Why is it necessary to conserve the fossil reserve present on the earth?
4. Distinguish between fractional distillation and destructive distillation
5. Distinguish between different types of coal

Worksheet 2

Use it like: checking students understanding in class, oral test

Identify the process given in the picture. What is it used for? Name any two products obtained after carrying out this process and their uses



Worksheet 3

Use it like:

State true/false:

1. Plastic is a natural resource. _____
2. Both sunlight and air are examples of inexhaustible natural resources. _____
3. Any substance that produces energy on burning is known as a fossil fuel. _____
4. Bituminous has higher carbon content than lignite. _____
5. Solar energy is an alternative source of energy. _____
6. Natural gas has a pale yellow colour. _____-



5. SOLUTIONS

This section gives you sample answers for activities and questions listed above.



Worksheet 1

1. Materials obtained from nature that are used by human beings for the fulfilment of their needs are known as natural resources. On the basis of their availability, natural resources are classified into two categories—inexhaustible and exhaustible natural resources. Inexhaustible natural resources are the resources which are available in abundance and are not likely to be exhausted by continuous use. Sunlight and air are examples of inexhaustible natural resources. Exhaustible natural resources are the natural resources which are present in limited quantity in nature, and can therefore be exhausted as a result of continuous use by human beings.
2. Some steps which can help us to conserve energy are as follows:
 - a. Switch off fans, lights and other electrical appliances when not in use. Also, use air conditioners, heaters and geysers only when required.
 - b. Avoid wastage of cooking gas. Use pressure cooker for cooking.
 - c. Use LED lamps in place of ordinary bulbs, as they consume less energy.
 - d. Use public transport and car-pooling whenever possible instead of personal vehicles.
 - e. Switch off the engine of your vehicles at traffic signals, or any place where you have to wait.
3. Fossil fuels are exhaustible natural resources. They take millions of years to form, and once exhausted, will not be available for use. Hence, we should conserve our fossil fuel reserves. A.

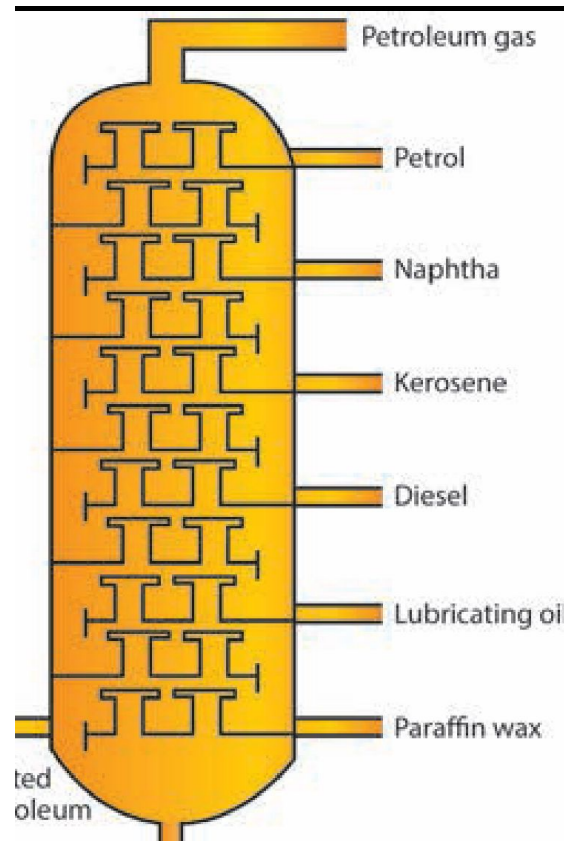
4.

Destructive distillation	Fractional distillation
Destructive distillation is the process of separation of solid components from a mixture by heating in absence of air.	Fractional distillation is the process of separation used mainly to separate liquid mixtures based on difference in boiling points.
Based on decomposition of solid	Based on difference in boiling point
Mainly used for coal	Mainly used to separate petroleum

5.

Anthracite	Bituminous	Subbituminous	Lignite
Found deep inside the Earth	Found at a moderate depth	Found above bituminous coal	Found close to the earth surface
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Very less impurity and moisture			High impurity and more moisture
Do not leaves residue on burning			Leaves residue on burning

Worksheet 2



Worksheet 3

1. False
2. False
3. False
4. True
5. True
6. False



6. EXTRA RESOURCES

Carry out the following suggested activities/ tasks if you have the time and resources to do them



1. Video Links:

Show the following videos to the students on computer/ tablet/ screen:

a) Fractional distillation:

https://www.youtube.com/watch?v=KCs1F_44dy4

b) Destructive distillation of coal:

<https://www.youtube.com/watch?v=P1ebNgtUwAo>

2. Extension involving more concepts:

Purpose: Awareness with respect to environment

Why we should encourage the use of alternate sources of energy rather than depending on fossil fuel.