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Fuels are classified based on several factors, such as their state, origin, and combustion characteristics. Below is a comprehensive classification of fuels:

1. Classification Based on Physical State

Solid Fuels

- Examples: Coal, wood, peat, charcoal, lignite, biomass.
- Characteristics:
 - High carbon content.
 - Relatively low efficiency compared to liquid and gaseous fuels.
 - Used in power plants, domestic heating, and industrial furnaces.

Liquid Fuels

- Examples: Petrol (gasoline), diesel, kerosene, ethanol, biodiesel.
- Characteristics:
 - High energy density.
 - Easy to store and transport.
 - Commonly used in vehicles, power generation, and heating.

Gaseous Fuels

- Examples: Natural gas, LPG (Liquefied Petroleum Gas), biogas, hydrogen, producer gas.
 - Characteristics:
 - Cleaner combustion with higher efficiency.
 - Require special handling and storage due to flammability and pressure requirements.
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2. Classification Based on Origin

Natural Fuels

- Derived directly from natural sources without extensive processing.
- Examples: Coal, wood, crude oil, natural gas.

- Characteristics: Abundant and relatively inexpensive in raw form.

Artificial Fuels

- Processed or synthesized from natural fuels.
 - Examples: Coke, charcoal, kerosene, synthetic fuels, hydrogen.
 - Characteristics: Improved properties like higher calorific value and controlled combustion.
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3. Classification Based on Combustion Properties

Primary Fuels

- Naturally available and directly usable.
- Examples: Wood, coal, crude oil, natural gas.

Secondary Fuels

- Derived or processed from primary fuels.
 - Examples: Petrol (from crude oil), coke (from coal), LPG (from natural gas).
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4. Classification Based on Calorific Value

High-Calorific Value Fuels

- Fuels that release a large amount of energy during combustion.
- Examples: Petrol, diesel, natural gas.

Low-Calorific Value Fuels

- Fuels with relatively lower energy content.
 - Examples: Peat, wood, low-grade coal.
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5. Classification Based on Carbon Content

Fossil Fuels

- Derived from the decomposition of organic matter over millions of years.
- Examples: Coal, petroleum, natural gas.

Biofuels

- Produced from living or recently living organisms.
 - Examples: Ethanol, biodiesel, biogas.
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6. Classification Based on Usage

Domestic Fuels

- Used in households for cooking, heating, and lighting.
- Examples: LPG, kerosene, firewood.

Industrial Fuels

- Used in industries for power generation, metallurgy, and chemical processes.
- Examples: Coal, furnace oil, natural gas.

Transport Fuels

- Used for running vehicles, ships, and airplanes.
 - Examples: Petrol, diesel, aviation fuel.
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7. Classification Based on Environmental Impact

Clean Fuels

- Produce minimal pollutants.
- Examples: Natural gas, hydrogen, ethanol.

Polluting Fuels

- Produce significant emissions during combustion.
 - Examples: Coal, heavy fuel oil.
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8. Emerging Fuel Types

Renewable Fuels

- Fuels replenished naturally.

- Examples: Bioethanol, biodiesel, hydrogen from renewable sources.

Non-Renewable Fuels

- Finite and deplete with use.
- Examples: Coal, petroleum, natural gas.