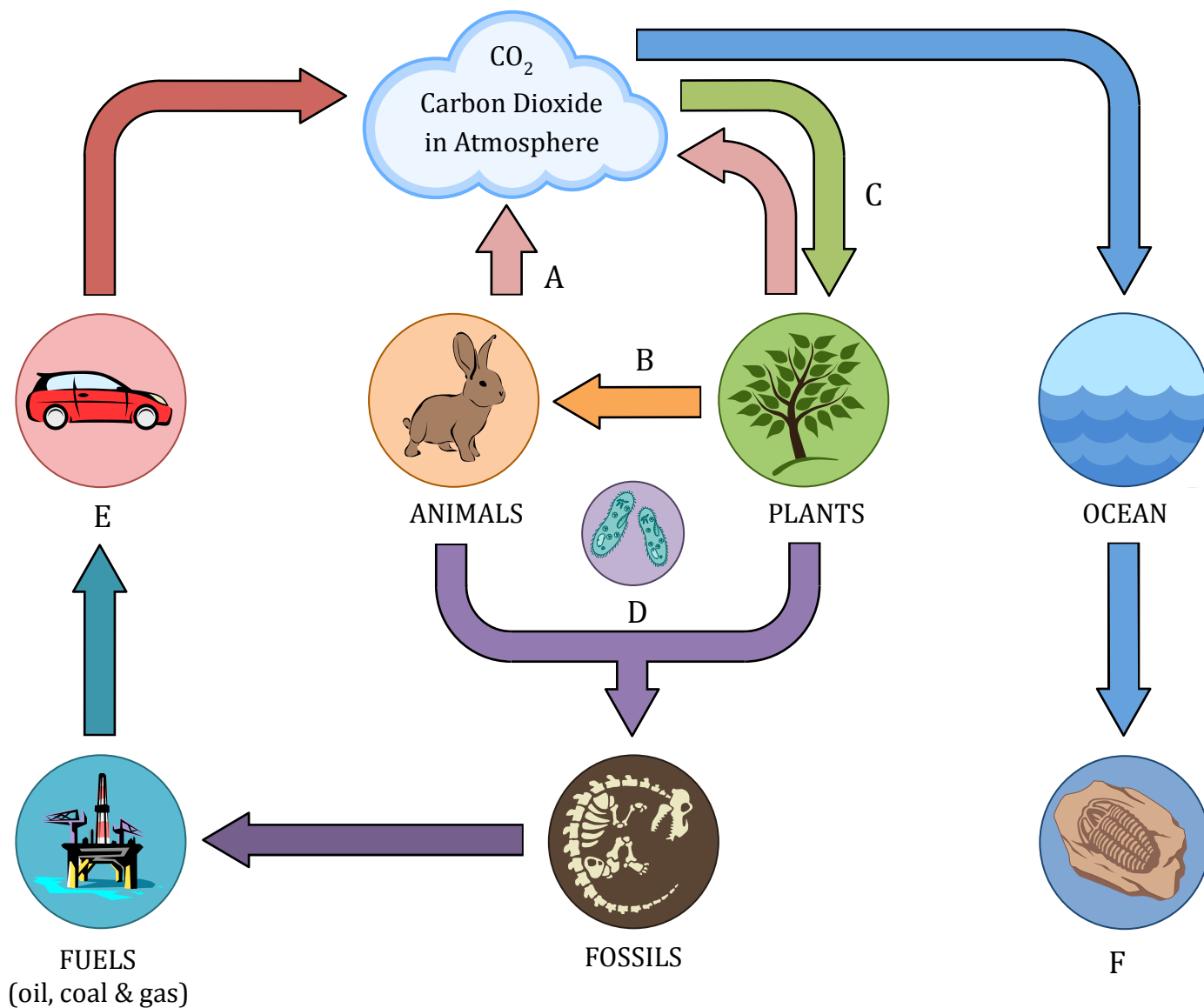


## 4.3 Carbon Cycling

### Carbon Exchange

Label the diagram of the carbon cycle to show the processes involved



A Cell Respiration .....

B Feeding .....

C Photosynthesis .....

D Decomposition .....

E Combustion .....

F Calcium Carbonate (in limestone and shells) .....

### Carbon Conversions

Write a balanced chemical equation for photosynthesis and (aerobic) cell respiration

Photosynthesis:  $6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$  .....

Cell Respiration:  $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 12\text{H}_2\text{O}$  .....

*Outline how carbon is stored in aquatic ecosystems*

Some carbon dioxide in water stays as dissolved gas, however most reacts to form hydrogen carbonate ions

When the ions come into contact with rocks / sediments, they commonly form calcium carbonate (limestone)

In animals, the calcium carbonate can be used to form hard exoskeletons (e.g. coral and shells)

*Describe the production of methane by methanogens and its oxidation in the atmosphere*

Methanogens produce methane from organic matter as a by-product of ANAEROBIC respiration (i.e. no oxygen)

The methane can either diffuse into the atmosphere or accumulate within the ground (natural gas deposits)

Methane in the atmosphere is oxidised to carbon dioxide and water after ~12 years

*Outline the formation of fossil fuels*

**Peat / Coal:**

In anaerobic conditions (e.g. waterlogged soils), saprotrophs can only partially decompose organic matter

The remaining carbon-rich material stays within the soil and forms peat

When compressed under sediment, the high pressure and heat force out moisture and turn peat into coal

**Oil / Natural Gas:**

Oil and natural gas form as the result of the decay of marine organisms on the ocean floor

Sediments are deposited on top of the organic matter, creating anoxic conditions that prevent decomposition

The compacted and heated organic matter forms oil and gas, which accumulates within porous rocks

*Describe the combustion of hydrocarbons*

When hydrocarbons are heated in the presence of oxygen, they undergo a combustion reaction to release

carbon dioxide and water as by-product (this reaction is exergonic - it produces energy / heat)

Sources of combustible hydrocarbons include biomass and fossilised organic matter (fossil fuels)

*Identify three human activities that can trigger carbon fluxes within the atmosphere*

1. Combustion of fossil fuels
2. Deforestation
3. Agricultural practices (ruminants produce methane gas)