

OXYGEN CYCLE

Definition: Circulation of oxygen in various forms, through nature. (This is a type of biogeochemical cycles).

Nature:  $\left\{ \begin{array}{l} \text{Free} = \text{In air} \\ \text{Bound} = \text{In water.} \end{array} \right.$

\* Oxygen is second only to nitrogen in abundance among uncombined elements in the atmosphere.

\* Plants and animals use oxygen to respire and return it to the air and water as carbon dioxide ( $\text{CO}_2$ ).

\*  $\text{CO}_2$  is then taken up by algae (in case of aquatic system) and terrestrial green plants and is converted into carbohydrates during the process of photosynthesis. Oxygen ( $\text{O}_2$ ) being a by-product of this process.

Sp. \* The waters of the world are the main oxygen generators of the biosphere, their algae are estimated to replace about 90% of all oxygen used.

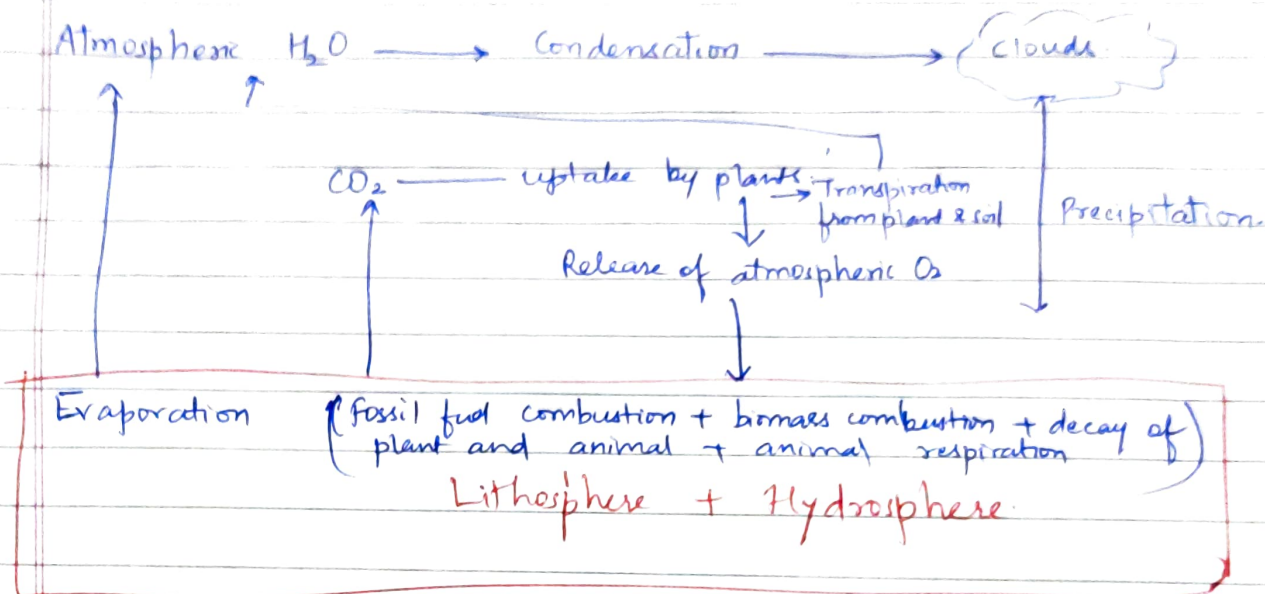
Note: Oxygen is involved to some degree in all the other biogeochemical cycles.

Example: ① Detritus from living organisms transfers oxygen containing compounds such as calcium carbonates into the lithosphere.

② Conversion of  $\text{H}_2\text{S}$  to  $\text{SO}_2$ ,  $\text{SO}_3$  and  $\text{SO}_4$ .

\* Despite of burning fossil fuels and the reduction of natural vegetations (on land and in the sea), the

level of atmospheric oxygen appears to be relatively stable because of increase in plant productivity resulting from agricultural advances worldwide



\* The cycling of oxygen occurs between different oxidation states.

Reservoirs of oxygen:-

- ① largest : Silicate and oxide minerals of crust and mantle (19.5% by weight)
- ② Atmosphere - 20.9% by volume (free)
- ③ Biosphere :- 22% oxygen by volume as component of organic molecule ( $C_xH_xN_xO_x$ )
- ④ Hydrosphere :- 33% by volume as components of water molecules with dissolved molecules including free oxygen and carbonic acids ( $CH_xCO_3$ )
- ⑤ Lithosphere :- 46.6% oxygen by volume present mainly as silica minerals and other oxide minerals.

Biological production:  
 $6CO_2 + 6H_2O + \text{energy} \rightarrow C_6H_{12}O_6 + 6O_2$

## # Abiotic production:

