



WATER QUALITY IN AQUACULTURE

Carbon dioxide

- Carbon dioxide (CO_2) is highly soluble in water and atmospheric CO_2 is absorbed at the air-water interface.
- CO_2 is produced within water bodies by the respiration of aquatic biota, during aerobic and anaerobic heterotrophic decomposition of suspended and sedimented organic matter.

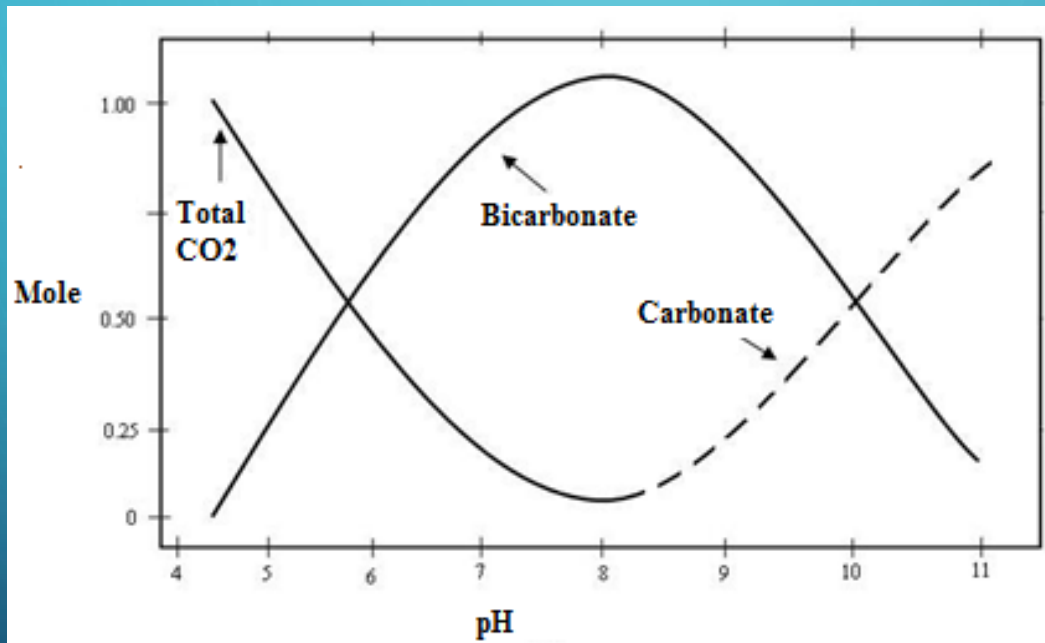
Carbon dioxide

- Carbon dioxide dissolved in natural water is part of an equilibrium involving bicarbonate and carbonate ions.
- Free CO_2 is that component in gaseous equilibrium with the atmosphere, whereas total CO_2 is the sum of all inorganic forms of carbon dioxide.

CARBON DIOXIDE

- Free CO_2 comprises the concentrations of CO_2 plus H_2CO_3 , although the latter carbonate form is minimal in most surface waters as they rarely exceed pH 9.
- At high concentrations of free carbonic acid (pH 4.5 or lower), water becomes corrosive to metals and concrete as a result of the formation of soluble bicarbonates.

CARBON DIOXIDE



HARDNESS

- The hardness of natural waters depends mainly on the presence of dissolved calcium and magnesium salts.
- The total content of these salts is known as general hardness, which can be further divided into carbonate hardness, and non-carbonate hardness.

HARDNESS

- Hydrocarbonates are transformed during the boiling of water into carbonates, which usually precipitate.
- Carbonate hardness is also known as temporary or removed, whereas the hardness remaining in the water after boiling is called constant. Different countries have different hardness units.

HARDNESS

Figure. Various hardness levels used in different countries

Hardness Level	Unit
French hardness level	10 mg/L CaCO_3
German hardness level	10 mg/L CaO
English hardness level	10 mg/0,7 L CaCO_3
USA hardness level	1 mg/L CaCO_3

HARDNESS

Figure. Various hardness levels regarding water calcium carbonate (CaCO_3) levels

Hardness grade	CaCO_3 (mg/L)
Soft	0-75
Medium hardness	75-150
Hard	150-300
Extreme hard	> 300