CO_2 ELIMINATION | GE 8

The dissolved CO_2 contents plays a very important part in water behaviour, and more especially in corrosion processes.

The CO_2 in excess can be eliminated either physically or chemically.

Physical CO_2 elimination

The CO_2 solubility in water follows the general laws of gas solubility, i.e. it decreases when:

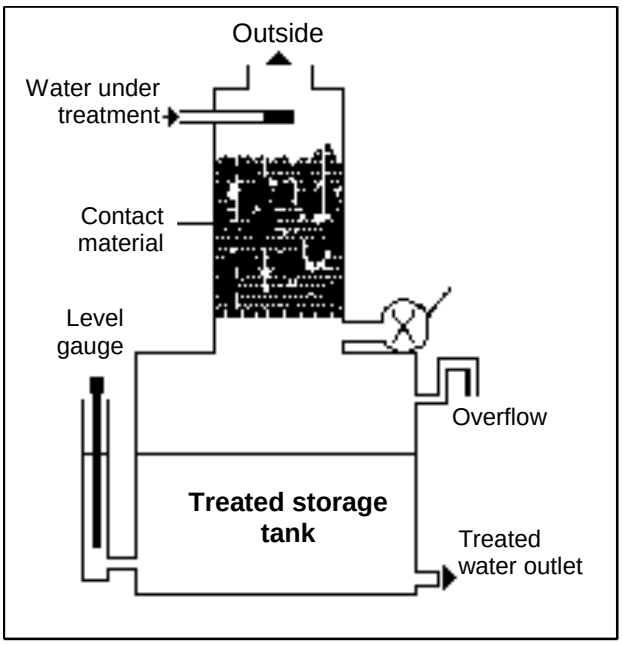
- temperature rises,
- water is placed in presence of a gaseous phase having a low CO_2 contents.

Atmospheric gas relief

Placing water in contact with air (having a low CO_2 contents) makes it possible to eliminate the dissolved CO_2, all the more thoroughly as water is finely sprayed and air is rapidly renewed.

Water is sprayed in a column lined with polyethylene rings; an air stream is injected in the reverse direction by a blower.

Placing water in contact with air results in a pressure drop most often requiring repressurisation downstream of the system.



Thermal gas relief

Spraying water into a steam back-flow under temperatures of about 105°C makes it possible to nearly totally eliminate all dissolved gases from water. This technique results in water temperature rise and is only useful for steam boiler supply.

Chemical CO_2 elimination

It is possible to make the excessive CO_2 react with a base or a carbonate according to the reactions:

$$\text{Base} + CO_2 \rightarrow \text{carbonate}$$

then

$$\text{Carbonate} + CO_2 \rightarrow \text{hydrogenocarbonate}$$

Practically, two techniques use these reactions: filtering through granulous material and reactants metering.

Filtering through granulous material

This technique consists in making the aggressive water percolate through a granulated calcareous product mass (marble, neutralite, magno).

Adding an alkaline reactant

To ensure CO_2 neutralisation, mineral or organic reactants are used:

- Mineral reactants:

They are mainly non volatile sodium compounds: caustic soda, carbonate, silicate, trisodic phosphate.

Each of these non toxic reactants features an "alimentary" quality.

- Organic reactants:

These are nitrogenous compounds that are volatile or likely to be taken away by water steam, such as ammonia, ammonium phosphate, aliphatic amines (hydroxylamine, ethanolamine) or cyclic amines (cyclohexylamine).

Among these compounds, ammonia is the only product of "alimentary" quality when used in low proportions. All the other compounds including one or

more amine functions feature a more or less noticeable toxicity level.