Eka Engineering: The SVP process

The SVP process is one of Eka Engineering's most commonly built processes to generate chlorine dioxide in large quantities.

Sodium chlorate is reduced by methanol in an acidic environment to form chlorine dioxide gas. The gas is then dissolved in water and used as a bleaching agent in the mill.

SVP-LITE®

Our large-scale, single-vessel processes (SVP) generate chlorine dioxide in a vacuum environment and produce a solid salt cake by-product. SVP-LITE® systems use methanol as a reducing agent.

SVP-SCW

The SVP-SCW (salt cake wash) process is an add-on option to the SVP-LITE process.

This is a preferred choice for pulp mills that want to further:

- Reduce their salt cake by-product (approximately 25%)
- Lower their acid consumption (approximately 17%)

In addition to acid recovery, SVP-SCW features all the same benefits as SVP-LITE.® It is possible to convert any SVP process to another with appropriate equipment changes.

Benefits

The SVP process is an ideal choice for pulp mills that look for the below specifications:

- Very high yield
- High strength ClO_2 water
- Very fast reaction rate, minimum start-up and stop time (few minutes)
- Easy to operate (one stage reactor)
- By-product Cl_2 reduced to negligible level
- Elemental chlorine free ClO_2 produced.
- Suitable for larger capacities
- Safe ClO_2 (high operation vacuum – less risk for decompositions)

Main reaction

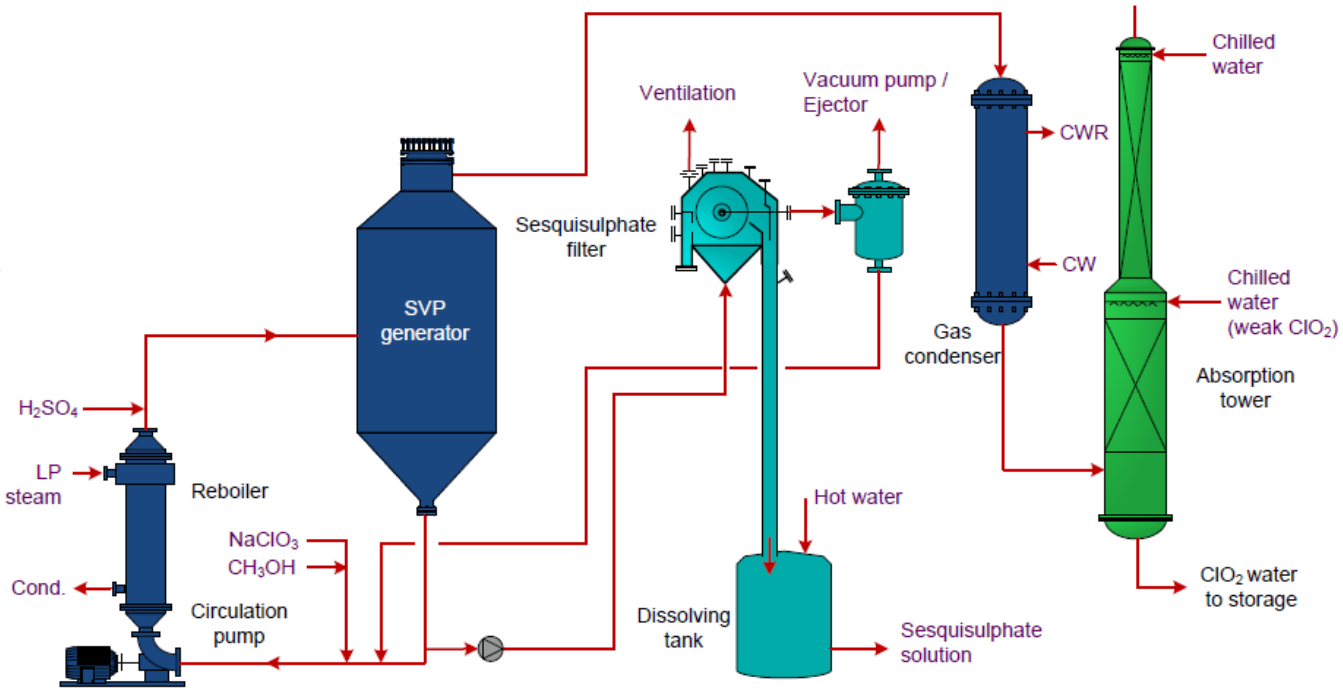
Our patented SVP-LITE® process generates chlorine dioxide (ClO_2) by reducing sodium chlorate ($NaClO_3$) using methanol (CH_3OH or MeOH) in a sulfuric acid (H_2SO_4) solution, according to the following reaction:

$$12\ NaClO_3 + 3\ CH_3OH + 8\ H_2SO_4 \longrightarrow 12\ ClO_2 + 4\ Na_3H(SO_4)_2 + 3\ HCOOH + 9\ H_2O$$

The by-product of this reaction is an acidic salt cake, sodium sesquisulfate $Na_3H(SO_4)_2$ that is approximately 18 - 25 wt.% sulfuric acid. By recovering the sulfuric acid from the sodium sesquisulfate salt, acid feed requirements and salt cake volume can be reduced by approximately 17% and 25%, respectively. Recovering this acid is the function of the salt-cake wash (SCW).

SVP- LITE® overview

The production of ClO_2 in the SVP-LITE® process is based on the reaction between $NaClO_3$, sulfuric acid (H_2SO_4), and CH_3OH. The heart of the process is an all-titanium ClO_2 generator, a large vessel in which the $NaClO_3$ is reacted to form ClO_2.



The key feature of the SVP-LITE® process is the circulation of the main reactor vessel, which is kept under vacuum:

1. Reactants (chlorate, methanol and sulfuric acid) are fed to the reactor system where they react to form chlorine dioxide and a salt cake by-product precipitates
2. Steam is added to the reboiler to evaporate water from the generator solution
3. Gas leaving the generator is a mixture of chlorine dioxide and water vapor, which is absorbed into water in the absorption tower
4. The absorption tower tail gas is further scrubbed to avoid emissions
5. A side stream of the reactor solution is fed to the filter, which removes the salt cake by-product
6. The reactor solution is returned to the reactor
7. Chlorine dioxide water from the absorption tower is transferred to storage tanks
8. An emergency stop interlock system is in place that will shut down the process should pressure, temperature or flow parameters operate out of range

Get in touch!

Nouryon's Eka Engineering extensive experience has enabled Nouryon to become experts in the design and installation of customized systems. Learn more about our services and contact our technical experts for further information!

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