

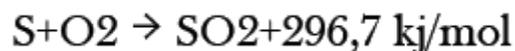


The company designs features of sulfuric acid plants

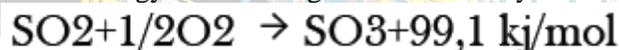


1- Maximum Saving Energy from resulted energy in furnace and converter

On average, for a standard process of producing sulfuric acid by sulfur, for each Kg of sulfuric acid 98%, about 5500 Kj absorbable energy, is produced. However, at the best situation, in many plant most are able to convert only about 35% of this energy to available steam. The amount is resulted by a Waste Boiler that is installed at the end of furnace. It causes the resulting the combustion gases of sulfur get cold from 850 ° C to 430 ° C.



About 25% of the other energy produced, is for SO₂ to SO₃ converting and also cooling of input gases to absorption towers, that is because these input gases have high temperature, the resulted energy is absorbable. Unfortunately in most sulfuric plants of many country, a major amount of energy is transferred to atmosphere by some air-gas heat exchangers. But in a lot of sulfuric plants of other parts of world, this notable amount of energy is saved by some specific equipment such as Economizer, super heater and boiler that convert the energy to steam to generate electricity or other consume .



And the rest of the released energy of sulfuric units that is about 40%, are related to SO₃ and water reaction.



Because of the limitation in allowed temperature range of sulfuric acid for circulation, the energy is not absorbable in the adsorption towers. The produced energy in this part, will be released to the atmosphere by some heat exchangers and cooling towers. The Company is one of the few companies that has saved the energy to produce necessary steam for generation of electricity base on widespread researches on this field to make suitable process and technology.

Indeed we will be able to increase Saving of energy to 40% in comparison with a common sulfuric acid unit by the recommended process to increase the producing of electricity and steam.

Also it will be able to increase the yield of steam producing to 65% for sulfuric acid unit by the resulted energy of converting of SO₂ to SO₃.

2- Electricity producing by Saving energy of the process

As it was illustrated in the previous part, there is a notable amount of produced energy in sulfuric acid units that it will be able to be used to generate saturated or superheat steam. So if the steam be not used in utility units, it will be possible to use it to generate electricity. The company is ready to design necessary processes to produce the superheat steam to generate electricity.

3- Double-absorption process design

Environmental issues have always been one of important concerns of many countries in world. In Sulfuric acid Units, double-absorption system is used to cut down the amount of output SO₂. Unfortunately, this issue has not been considered by many country's producing units and authorities did not pay enough attention to this issue too. So this company is able to design sulfuric units based on double-absorption process. It causes the concentration of output SO₂ to atmosphere gets 10 times less. Also the company is able to update running one-absorption units to double-adsorption process.

4- Decreasing of SO₂ Contain in single-adsorption Stack :

we are able to increase efficiency conversion of SO₂ to SO₃ in single-adsorption process in compared with double-adsorption process in converter by using of new generation catalyst. Also it is possible to improve the efficiency by making isothermal conditions in converter catalyst beds. So the defined action will cause the decreasing in cost of equipments and in amount of output pollution of sulfuric units. Meanwhile the action will cause easier operating and the increasing of catalyst life. The company is searching and studying for the latest productions of catalysts and their thermodynamic effects and is able to create isothermal condition in catalyst beds.

Also it is possible to decrease the amount of pollution by kind of scrubber that is set in the end of producing process.

5- Promote the useful life of the equipment:

One of important subjects on designing of sulfuric units, is increasing of each equipment efficiency and life. It gets more difficult for different thermodynamic conditions, acid gases and high concentration acid in all part of producing process. So it is necessary to know which materials are suitable for each condition to increase the life and efficiency of equipment. There is no doubt that the latest technics of equipment designing could be useful in this way.

Following samples can be good examples for this field:

A: symmetrical design of heat exchangers in the way that be able to change and replace its head and end each year.

B: using of suitable lining instruments in equipments (Considering of brick expansion coefficient and metal surfaces, creating a convex surface for the bottom of the absorption and drying towers, the separating layer between the bricks and metal surfaces and using the appropriate profile for the different layers of insulation)

C: suitable mechanical design of each equipment : high weight of equipment, pipes and ducts in this unit have caused so many mechanical stresses in more areas. So the company beside analyzing the tensions, prepares design and specific instructions for each equipment that will save the efficiency of them during of their life time.

D: using of necessary protective systems such as anodic protection in tubes and hot concentrated acid exchangers.

6- Using of new cooler acid generation with anodic protection:

For concentrated acid cooling, spiral tubes on a water pool are a common choice in old plants . It is not a good choice to cool acid because it has been disused for 40 years in the world.

Nowadays shell and tube or plate heat exchangers with anodic protection are used for these targets that longer life time and less cost are notable features of this method. The company uses this method too to design sulfuric Acid coolers and pipelines .

7-Efficiency enhance of absorption and drying towers:

Efficiency and design method of adsorption and drying towers are important parameters of sulfuric unit design. The company has done widespread researches on ceramic packing field to design adsorption towers. It causes the ceramic packing efficiency has gotten about 20% more. Also researching and studying on acid Distributor performance on packing surface has caused better performance of these equipments. In other hand, modifying of acid spraying method on ceramics has caused amount of vapors and acid drops cut down and get less. So this is why the amount of SO₃ vapor and sulfuric acid get less in output flow of adsorption tower, that it causes equipment life time gets less. Also using of suitable and new Eliminator Mists on top of the tower will help to eliminate these vapors and acid drops. Form and size designing of gas input nozzles has caused the gas flow be able to be distributed uniformly on ceramic packing surfaces and it causes absorption efficiency improves.

8-Using horizontal convertors:

Horizontal design of convertor causes improving of catalytic bed efficiency and easier operation of convertor. The ability of brick-built in all levels of surface, easiness of filling and emptying of catalytic beds, ability of putting heat exchangers or super heaters inside of convertor tower, less gas drop pressure, better gas distribution in catalytic beds and preparing isothermal condition in catalytic beds, are good samples of the convertor features.

9-Less electricity consumption:

Useful designing of the company and less drop pressure in different process equipments, have caused the company designed unit electricity consumption amount decreased about 20%. Accurate and proper design of duct lines, process equipment and using proper catalyst in each bed has caused the system operates at a lower pressure. So the function of blowers electromotor will minimize. This is also true in acid sulfuric circulatory system, which has caused the unit electricity consumption amount be saved.

