The formed sulfur oxide SO_3 leaves the contact apparatus and enters the absorption tower through a heat exchanger.

The third stage is the absorption of SO_3 by sulfuric acid in the absorption tower.

If water is used to absorb sulfur oxide, sulfuric acid is formed in the form of a mist consisting of tiny droplets of sulfuric acid (sulfur oxide dissolves in water with the release of a large amount of heat, sulfuric acid is so hot that it boils and turns into steam).

In order not to form a sulfuric acid mist, 98% concentrated sulfuric acid is used, while heating the liquid is insignificant and safe. Sulfur oxide dissolves very well in such an acid and forms oleum ($H_2SO_4 \cdot nSO_3$). The reaction equation of this process:

$$nSO_3 + H_2SO_4 \longrightarrow H_2SO_4 \cdot nSO_3$$

The resulting oleum is poured into metal tanks and sent to a warehouse. Then the tanks are filled with oleum, the trains are formed and sent to the consumer.

Contact sulfuric acid production from elemental sulfur

The technological process for the production of sulfuric acid from elemental sulfur by the contact method differs from the production process from pyrites by a number of *features*. These include:

- a special design of furnaces for producing furnace gas;
- high content of sulfur oxide (IV) in the furnace gas;
- the lack of a stage of pre-treatment of furnace gas.

Subsequent operations of contacting sulfur oxide (IV) on the physicochemical basis and hardware design do not differ from the pyrite-based process.

The sulfuric acid production scheme from sulfur consists of:

- air drying;
- sulfur burning;
- gas cooling; contacting;
- absorption of sulfur oxide (IV)
- the formation of sulfuric acid.

The "wet" catalysis

There is also a method of *producing sulfuric acid from hydrogen sulfide*, called *"wet" catalysis*. It consists in that a mixture of sulfur (IV) oxide and water vapor produced by burning hydrogen sulfide in an air current is fed without separation to a contact where sulfur (IV) oxide is oxidized on a solid vanadium catalyst to sulfur (VI) oxide. The gas mixture is then cooled in a condenser, where the vapors of the sulfuric acid formed are converted into a liquid product. Thus, unlike the methods of sulfuric acid production from pyrite and sulfur, the wet catalysis process does not have a special stage of sulfur oxide (VI) absorption and the whole process involves only three consecutive stages:

1) hydrogen sulfide combustion:

$$H_2S + 1{,}5O_2 = SO_2 + H_2O - \Delta H_1,$$

where ΔH_1 = 519 kJ with the formation of a mixture of sulfur oxide (IV) and water vapor equimolecular composition (1:1).

2) oxidation of sulfur oxide (IV) to sulfur oxide (VI):

$$SO_2 + 0.5O_2 = SO_3 - \Delta H_2,$$