and fiber filters that reduce the dust content in the gas to 10-20 g/m^3. Electric gas purification in electrofilters reduces the dust and mist content in the gas to 0.05-0.1 g/m^3.

After general cleaning, the firing gas obtained from pyrite is necessarily subjected to special cleaning to remove dust and mist residues and, mainly, arsenic and selenium compounds, which are disposed of. The special gas purification includes operations of cooling it to a temperature below the melting points of arsenic oxide (315 ºC) and selenium (340 ºC) in towers irrigated successively with 50 % and 20 % sulfuric acid, removal of sulfuric acid mist in wet electrofilters and final drying of the gas in scrubbers irrigated with 95% sulfuric acid. From the special cleaning system, the roasting gas comes out at a temperature of 140-150 ºC.

Selenium (IV) oxide extracted from the firing gas is reduced by sulfur (IV) oxide dissolved in sulfuric acid to metallic selenium, which is deposited in settling tanks:

$$SeO_2 + 2SO_2 + 2H_2O = Se + 2H_2SO_4$$

A new progressive method of cleaning the roasting gas is the adsorption of impurities contained in it by solid absorbers, for example, silica gel or zeolites. With such dry cleaning, the firing gas is not cooled and enters the contact at a temperature of about 400ºC, so that it does not require intensive additional heating.

Sulphuric acid production. Physico-chemical bases and technological schemes of contact method of sulfuric acid production from sulfur dioxide and sulfur. Ways of intensification of sulfuric acid production

Sulfuric acid is a colorless viscous liquid, with a density of 1.83 g/ml (20º). The melting point of sulfuric acid is 10.3 ºC, the boiling point is 269.2 ºC.

The chemical properties of sulfuric acid largely depend on its concentration. In laboratories and industry, diluted and concentrated sulfuric acid is used, although this division is conditional (a clear boundary between them can not be drawn).

Commodity types of sulfuric acid:

- *Tower* H_2SO_4 (*nitrous*): C=75-77%, $T_{crystallization}$ = -29.5ºC
- *Contact* H_2SO_4: C=92.5%, $T_{crystallization}$ = -22.0 ºC and C=98.3%
- *Concentrated* H_2SO_4:C=100%
- *Oleum* $H_2SO_4 \cdot nSO_3$: contains 18-20% free SO_3, $T_{crystallization}$ = +2 ºC.

Sulfuric acid is transported in railway and tankers made of acid-resistant steel; stored in hermetically sealed containers made of polymer or stainless steel coated with an acid-resistant film.

The main directions of use of sulfuric acid:the production of mineral fertilizers, sulfates, synthetic fibers; ferrous and non-ferrous metallurgy; production of organic dyes, alcohols, acids, esters; food industry (molasses, glucose), emulsifier (thickener) E513; petrochemicals (mineral oils); explosives production; catalysis, etc.

The raw materials for the production of sulfuric acid are: native sulfur, exhaust gases of thermal power plants, sulfates of iron, calcium, hydrogen sulfide, Cu_2S, ZnS, PbS (non-ferrous metals), gypsum, FeS_2 (pyrite) with a sulfur content of 54.3%. Pyrite mineral concentrates are obtained by enrichment of non-ferrous metal ores.

Technology for the production of sulfuric acid

In industry for the production of sulfuric acid, two main methods for the oxidation of SO_2 are used:

1. *contact* - using solid catalysts;
2. *nitrous* - with nitrogen oxides.

Contact method for the production of sulfuric acid from pyrite FeS_2