

WAYS OF MINING ENTERPRISES ECOLOGIZATION

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Open minerals mineability influences very negatively on environment state. It causes landscape and aerological changes, promoting pollution of adjacent territory, air and water basins. That is why one of the most important tasks of mining science and practice is the establishment of causes and scales of possible pollution of mineral resource regions.

The main polluting components, generated during blasting operations realizing, are: carbon monoxide CO, nitric oxide NO_x and water solution of ammonium nitrate (AN).

It is known from the practice of blasting operations realizing that water-filled grammonite 79/21 is used at forming of explosive charge (EC) in wet holes. But during present type of EC use the particular qualities of mixing of grammonite 79/21 with water and the impact of consequences of this EC explosion on environment were not considered.

At mixing of grammonite 79/21 with water a part of AN is dissolved in water, and fat solution fills up inter-granule spacing. At the same time charge shrinkage and packing take place.

Process of EC solution and shrinkage, analyzed further, is typical for the way of charging with water admission into measuring apparatus of charge mechanism with subsequent product feeding into a hole.

In dry grammonite 79/21 with mass of 1000 g granules occupy volume of 690 sm³, and volume of inter-granule spacing (interstice volume) is 362 sm³.

At addition of 20 kg of water to 100 kg of grammonite 79/21 mixtured composition of water-filled grammonite 79/21 (17,5 % of trotil, 65,8 % of AN and 16,7 % of water) is formed.

At water-filling a part of AN is dissolved in water, and solution fills up inter-granule spacing. At the same time charge shrinkage and packing take place. At charging and locating of grammonite 79/21 in hole the additional AN dissolving takes place, corresponding to its solubility at environmental temperature.

Receipt composition of water-filled grammonite 79/21 with AN particular dissolving is presented in Table 1.

Table 1. Mixture receipt composition

Components name	Trotil (granulotol)	Ammonium nitrate	Water
solution of ammonium nitrate			
Mass part of components, %	17,5	40,7	41,8

So, in translation to 1 kg of water-filled grammonite 79/21 we have 418 g of 60%-e AN solution, 407 g of insolutable ammonium nitrate and 175 g of trotil. The volume, occupied by granules of trotil and insolutable ammonium nitrate,

is equal 582 sm³. Therefore, the shrinkage of EC example forms 470 sm³ or 45 %, and inter-granule spacing of interstice is 181 sm³.

Density of 60%-e AN solution is 1,27 g/sm³. Therefore, 418 g of 60%-e AN solution occupy volume equal $418/1,27 = 329$ sm³.

So, 181 sm³ or 230 g of solution is among granules, the rest part (148 sm³ or 188 g) is contained above the charge.

AN dissolving process happens quickly only in the beginning. For complete solution saturation it needs 3-5 hours. But during carrying out mass explosions this time is quite enough (if small open-cast mines, where explosions are carried out in 1-3 hours after charging beginning, may be excluded).

In final result we receive the charge of water-filled grammonite 79/21 (lower part) with components correlation on mass: 67,1 % of AN; 21,6 % of trotil; 11,3 % of water.

Water-filled grammonite 79/21 keeps 81,2 % of mixture mass, and average weighted density of such charge is 1,4 g/sm³.

Above water-filled grammonite 79/21 there is 60%-e AN solution that was not put in inter-granule spacing, in amount of 18,8 % of mixture mass.

It is necessary to get into account, that oxidizing agent solution, located above explosive charge, is not exploded separately without solid phase with trotil, except of solution column, adjoining to the charge directly.

Amount of AN water solution in average statistic hole that is not decomposed under influence of explosion, composes nearly 160 kg, in which there is 96 kg of ammonium nitrate.

In conclusion, the use of grammonite 79/21 by technology of water-filling may influence considerable negatively on environment and, as consequence, health state of working people and inhabitants of settlements. That is why it is necessary before introduction of some type of explosive to realize careful research their ecological "clearness".