

Ecology/2. Ecological and meteorological problems of cities and industrial zones.

Cand.tech.sc. Stolyarova N. A., Chekhlan N. A., Egorova E. A.

Automobile-Highway Institute of the State Higher Educational Establishment

«DonNTU», Ukraine

Utilization of fluorescent lamps on the demercurization equipment «Ecotrom-2»

Problems relating to the environmental pollution by mercury and its compounds rank high among actual ecological issues. Mercury is one of the most dangerous metals polluting environment. Wastes containing mercury are referred to the first (the most dangerous) danger class. Energy efficient fluorescent lamps are especially dangerous from the position of the local pollution by toxic mercury. The most widespread types of fluorescent lamps contain mercury up to 300 mg.

The mercury extraction process from lamps is executed by the demercurization on special equipment. Demercurization is the process of mercury and its compounds extraction by the mechanical or physicochemical methods. Its purpose is the avoidance of man's intoxication by mercury vapour [1].

The problem of the mercury pollution prevention is decided in many respects by the efficiency of techniques applying for the neutralization and processing of wastes containing mercury.

The method of the fluorescent lamps processing was developed and introduced by the scientific production association «Ecotrom» (Russia) on the basis of which modifications of the installation «Ecotrom-2» were developed. They allow to process mercury-containing lamps of different shapes and sizes.

Operating principal of the pneumatic vibration installation «Ecotrom-2» (Fig.1) is based on the separation of fluorescent lamps into main components: glass, metallic lamp cap and mercury-containing luminophor.

The installation is composed of two main blocks: lamp separation unit containing loading unit, pneumatic vibration separator with a crusher, cyclone and

purification system involving bag filter, absorber and gas blower with compressor.

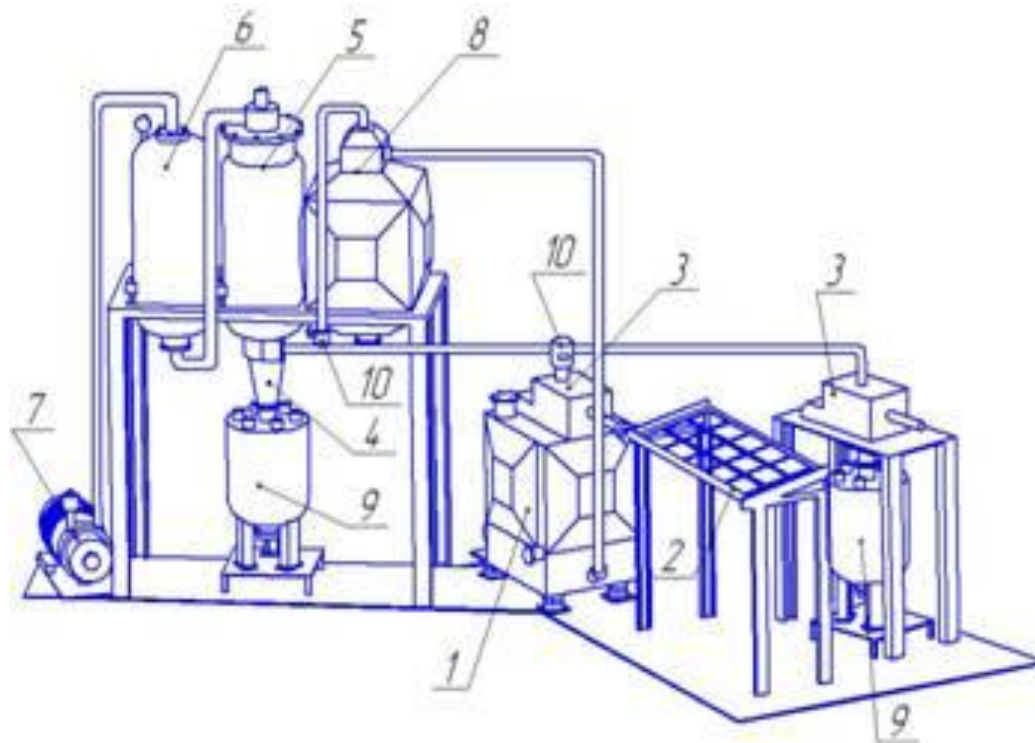


Fig.1 – Installation diagram «Ecotrom-2»: 1 – pneumatic vibration separator, 2 – loading unit, 3 – pneumatic impact crusher, 4 – cyclone, 5 – fine filter, 6 – absorber, 7 – gas blower, 8 – intermediate collector of crushed glass, 9 – transport technological collector of luminophor , 10 – stopcock.

The processing of fluorescent lamps on the installation «Ecotrom-2» is carried out as follows: fluorescent lamps delivered in the special containers are fed in the loading unit. Due to the high depression lamps are continually fed to the accelerating tube, get in the crusher and crushed to a particle size of glass up to 8 mm [2].

Lamp caps are separated from glass on the vibrating grid and removed in the collector – technological container. As a result of heat treatment lamp caps are completely cleaned from the residual mercury wastes.

The separation of the luminophor—the main mercury carrying agent, from glass is carried out by its blowing in the countercurrent moving system «cullet-air» in vibration. Glass purified from the luminophor goes into the storage hopper.

The high efficiency of the installation «Ecotrom-2» should be noted. The main characteristics of the installation «Ecotrom-2» are given in the table 1 and in the table 2.

Table1 – Installation efficiency

№	Name	Number,weight	Efficiency(per hour)
1	Used lamps	pcs.	1200
2	Cullet	kg	250-280
3	Luminophor	kg	15-18
4	Lamp caps	kg	5

Table 2 – Installation power and material consumption

№	Number	Number	Unit	Number
1	Electric power	including: gas blower crusher vibrator others	kW/h	11,0 7,5 2,0 1,1 0,4
2	Activated carbon	absorbers	t/year	0,5
3	Compressed air	bag filter air washing	m ³ /year	0,3
4	Sanitization	sanitization	l/shift	20

Fluorescent lamps processing gives:

- glass –the major part of the lamp weight – it can be recycled for the fluorescent lamps production;
- metals –iron, aluminium, copper – from contacts and ballast;
- glue and plastics – are not utilized currently. They undergo recuperation during combustion;
- luminophor –is not recycled usually. After the purification from mercury, it must be buried;
- mercury – is recycled. Recycled mercury covers up to 40% world requirements.

Literature:

1. Тимошин В. Н., Тиняков К. М., Макаrenchенко Г. В., Кочуров А. В. Демеркуризационное оборудование «Экотром-2» // Твердые бытовые отходы. – 2011. – № 4
2. www.ecotrom.ru