

ABSTRACT

Rare earth elements (Sc, Y and group 15 lanthanides) and their compounds currently have significant practical use in metallurgy, glass industry, as highly active catalysts for the production of so-called. NiMH batteries, alloys for the manufacture of permanent magnets and e.g. moderators rods in the nuclear energy, but above all they have an irreplaceable role in modern electronics for phosphors TV screens, CRT earlier today, PDP and LCD monitors and displays, tablets, mobile phones etc., which give them a high-quality picture and sound. Unlike most base and precious metals are concentrated in the conquerable ore deposits, occur in the form of compounds as part of mixed minerals in the rarely economically exploitable concentrations, a mining and processing is costly and negative impacts on the environment, paradoxically towards the title but their overall content in the crust is relatively high, the average concentration in the range of about 150 to 220 ppm. The main world producer of REE, China, in 2010, significantly reduced exports by 40 %, making prices of some REE increased up to 1500 % during the month. Demand for REE is growing, so often talks about the recycling of valuable materials back into production, as called. "Urban mining", ie "urban mining", thereby reducing the amount of waste going to landfill and the possible risk of release of toxic elements in the environment. For these reasons, the development of new possibilities for the recycling of electrical and electronic equipment (WEEE), eg. a phosphor screen TV. Company ASEKOL, a. s., which returns the collection and processing and to provide study material for this work, the technology is able to recycle up to 80 % of the TV and the company AQUATEST, a. s., which has developed a new modular recycling line for flat screens.

The experimental part is focused on the elemental composition of flat panel display devices. It was collected and processed 64 samples of glass from cathode 3 groups: plasma TVs (PDP TVs), LCD PC monitors (LCD M) and LDC TVs (LCD TV). The obtained data were compared with studies of elemental composition of older screens, PC monitors and PDP TV. ICP-MS were in the PDP screen compared to LCD monitors and LCD televisions concentrations detected REE and Ag to thousands of mg/kg, in hundreds of mg/kg of Gd, Eu, Tb, elements Ce, Yb, Sc in dozens of mg/kg, and all other in units of mg/kg. The lowest concentrations of most of REE were measured in PC LCD monitors and Ag were in LCD monitors and LCD TVs below the detection limit. Compared PDP screens, concentrations of REE in most LCD monitors and LCD TVs below 1 mg/kg. In terms of economics, it is possible to think about recycling Ag in the case of PDP screens. The average content of 1 tonne of recycled devices by example. Ag amounted to 678 mg/t. It was confirmed by the decreasing consumption of REE depending on the age of the screen.

Keywords: precious metals, electrical and electronic waste (WEEE), ICP-MS, LCD screen, LED screen, phosphors, plasma screen, flat display device, rare earth elements (REE), recycling, liquid crystals, urban mining