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DISSERTATIONS

Electrostatic Separation of the Shredded Plastic Mixture Using Cyclone Tribocharger. Gjergj Dodbiba, Faculty of Engineering and Resources Science, University of Akita, Akita, Japan, M.Sc. Thesis (March 2001). Supervisor: Professor T. Fujita

The experiments of tribo-electrostatic separation were carried out on artificial mixtures of polyethylene terephthalate (PET) and either polyethylene (PE) or polypropylene (PP). Mixture samples were created by chopping PET bottles and their caps into flakes by a shredder. The flakes were of irregular shapes up to 3.5 mm in size. No special treatment of the materials was done prior to the experiments.

The mixture was charged by friction in a cyclone. After a certain period of tribo-charging inside the cyclone, the charged flakes fell down freely through a horizontal electric field into a collecting bin divided in five sections. The DC electric field of 333 kV/m was created by using two parallel plate electrodes made of copper (Cu) and having a given cross-section configuration. The plastic flakes of the mixtures were drawn to either positive or negative electrode according to the polarity of their surface potential and were separated as they reported into different sections of the collecting bin.

In order to ensure easy and efficient separation, the inner wall of the tribo-cyclone was made of a suitable plastic material to improve the frictional charging of the plastic flakes.

The grade higher than 95% and the recovery higher than 75% were obtained in separation of each plastic component.

The Application of Microwave Radiation to Beneficiation of Minerals. Ingrid Murova, Institute of Geotechnics of the Slovak Academy of

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Sciences, Kosice, Slovakia. Ph.D. Thesis (October 2001). Supervisors: Drs. I. Florek and S. Jakabsky.

The effect of microwave radiation on rock failure, disintegration of minerals and ores, coal desulphurisation, alteration of magnetic properties of ores and thermal processing of rocks were studied. Parameters characterising the microwave heating of materials, such as dielectric permittivity, the loss angle, the depth of penetration and the microwave output were investigated with the aim to obtain information about the effect of microwave radiation on various materials.

On the basis of the heating rate, irradiated minerals were divided into weakly heating minerals such as quartz and barite while chalcopyrite, pyrite, galena, magnetite and siderite were found to be well-heating minerals. Microwave irradiation of siderite demonstrated formation of new strongly magnetic phases and considerable increase in magnetic susceptibility of the material. Investigation of rock failure confirmed that a high level of failure could be observed in materials that absorb microwaves readily, e.g. dolomite and limestone. By microwave pretreatment, disintegration of siderite ores (as measured by work index) increased by a factor of 8 to 18 per cent.