

About colloidal Structure and Peptisation of Coals with Melted Waste Plastics

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Some researchers consider coal as solid colloid structure. Thus, the main properties of coking coal, such as viscosity of plastic-coal mass, thickness of plastic layer, temperature interval of plastic state depends on disperse phase-dispersion medium proportion, which is the function of coal metamorphism range.

Therefore, softening of coal at the time of coking is just transition of solid gel into liquid sol (so called pyro-sol) by means of dispersion medium increase. When temperature mounts to the end of the temperature plastic state interval, growth of dispersed phase at the expense of dispersion medium leads to conversion of sol into gel (semi-coke) and further into coke crystal structure.

Peptisation of colloid with appropriate solvent allows converting gel into sol at lower temperature, therefore, broaden temperature plastic state interval at coking. Authors peptised the following coals: lignite, candle, gas, fat, coking, lean, anthracite with different solvents: ethyl, isopropyl, iso-butyl alcohols, acetone, mono- and dy-terpene, benzene, toluene, pyridine and water at 20°C, besides, with melted phenol, naphthalene, paraffin, polyamide at temperature up to 350°C.

It was measured: swelling degree of the coals, optical density of residual solvent after peptisation, angle of light leakage by colloidal particles in residual solvent, viscosity of residual solvent, viscosity of plastic-coal mass.

Correlation between swelling degree of the coals, viscosity of plastic-coal mass and content of colloidal particles on residual solvent was discovered. Colloidal particles dimensions increase according to coal metamorphism range. Swelling degree of the coals depend on chemical nature of a solvent.

Coals are peptised best: lignite one in alcohols, phenols, candle one in aldehydes, ketones, gas one in cycloalkanes, fat one in polycycloalkanes, resin acids, coking one in aromatic hydrocarbons, lean one in polyaromatic hydrocarbons. Melted plastic give the biggest swelling degree of the coals and decrease of viscosity of plastic-coal mass: lignite one with acrylic resin, candle one with polyamide, gas one with polyethylene, fat one with polyethylene terephthalate, coking one with polystyrene, lean one with resins.

Obtained results show, that colloidal structure of coal define its coking plastic properties to a great extent and chemical nature of colloidal dispersion medium is different in coal of different metamorphism range.

Melted waste plastics are very prospective kind of peptising solvent for coals, especially keeping in mind their huge amount and cheapness.