Title (en)

METHOD FOR DETERMINING SURFACE TENSION OF A COMMINUTED SOLID

Title (de)

VERFAHREN ZUR BESTIMMUNG DER OBERFLÄCHENENERGIE VON FEINTEILIGEN FESTSTOFFEN

Title (fr)

PROCEDE POUR DETERMINER L'ENERGIE DE SURFACE D'UN SOLIDE FINEMENT DIVISE

Publication

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Application

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Priority

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- FR 0007878 A 20000620

Abstract (en)

[origin: FR2810401A1] Determination of the numerical value of the surface tension of a comminuted solid comprises the use of a tube partly filled with the comminuted solid and closed at one end by a permeable membrane immersed in a liquid. The liquid is first allowed to rise freely in the tube, a back pressure is applied, the liquid is again allowed to rise freely and a second back pressure is applied. The mass of risen liquid is measured continuously against time and the surface tension psi is calculated A tube whose lower end is hermetically sealed by a membrane permeable to liquids is ca. 80% filled with the solid to be tested. The lower part of the tube is then immersed in the liquid. The liquid is allowed to rise freely in the tube and the mass variation of the remaining liquid is measured against time to obtain the gradient 1 of the line described by the equation m<2> = f(t) (equation 1). Once 10-20% of the total height of the powder is in contact with the liquid, a first back pressure is applied to the top of the tube to stop the capillary rise of the liquid in the tube through the solid.The mass of liquid remaining is measured again to deduce after calculation the mass of liquid risen before equilibrium is reached using DELTA P = (A. DELTA psi) - (iota rho gh) (equation 2), where A is the specific area of the solid (m<2>/m<3>), DELTA psi = psi S - psi SL, the difference between the surface tension of the solid (psi S) and of the solid- liquid interface (psi SL); iota is the porosity of the solid, rho is the density of the liquid, g is acceleration due to gravity (9.81), h is the height of the solid in the tube and DELTA P is the variation in pressure applied to the tube. The pressure is stopped to allow the liquid to rise freely again until the solid is completely immersed, with the mass of remaining liquid constantly measured. Equation 1 then gives gradient 2 and the porosity iota is calculated using iota = (volume of liquid at saturation)/(volume of powder in the tube) (equation 3). Equation 4 gives OMICRON exp = (iota pi .R<2>)<2>/ beta , where OMICRON exp = (1/(2 x phi liq) x gradient 2, with phi liq = rho / epsilon where epsilon is the viscosity of the liquid in Pa.s, R is the internal radius of the tube, iota is the porosity of the solid, and beta is the tortuousness coefficient. Depressurization is applied for 300-1000 seconds to measure the remaining mass of liquid after the tube is filled and the kinetic variation of the mass of liquid in the tube and the specific area of the powder A are calculated using equation 5: A<2> = (DELTA P/5 epsilon hv) x (iota <2>/(1- iota), where v is the speed of rise of the liquid. A second back pressure is applied to the top of the tube for a period of 300-1000 seconds, preferably 60-600 seconds, to recalculate the specific area derived from the fourth phase. The solid is a synthetic or natural organic or mineral polymer. Preferred Features: The liquid is an alkane or other organic component. The liquid has a mean density of between 0.6 and 3.5 and a mean viscosity of between 0.1 and 1000 mPa.s. The first back pressure is between 5 and 800 mbars, the depressurization is between 5 and 200 mbars and the second back pressure is between 5 and 200 mbars. The first and second phases are repeated successively 3 or 4 times if the liquid rise is less than 10 mm. The membrane is natural cellulose with threshold values of 1-10 microns m, or a microfiber membrane with a similar threshold value.

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