新的非离子型微粒助留助滤体系及其机理的研究

论文标题:新的非离子型微粒助留助滤体系及其机理的研究
Studies on a New Nonionic Microparticle Retention System and Its Retention Mechanism
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2004-06-01论文网 http://www.lw23.com/lunwen_371641782/ PEO;微粒;凹凸棒粘土;锂基膨润土;助留助滤;阴离子杂质;插层改性;助留机理
PEO, microparticle, attapulgite, Li-bentonite, drainage and retention, anionic trash,intercalation modification, retention mechanism
目前造纸工业为了节约纤维原料和水资源，大量使用高得率浆、脱墨废纸、涂布损纸以及提高纸机白水循环封闭程度。这就使纸机湿部溶解性和胶体性物质越来越多，对纸机湿部操作的危害也越来越大。从而使阳离子型微粒助留系统的适用范围或使用效果受到很大的限制，助留助滤效能不能充分发挥出来。另外对添加到湿部系统中的其他造纸助剂可能产生较大的影响。为了解决这些问题，本论文拟开发出一种新型的非离子微粒助留助滤系统来弥补已有的助留助滤系统的不足，并对其絮聚机理进行探讨。 本课题研究的是PEO／硅酸盐矿物非离子微粒助留体系，具体内容包括：(1)不同的PEO／硅酸盐矿物微粒助留助滤体系的研究；(2)PEO／凹凸棒粘土微粒助留体系的影响因素；(3)凹凸棒粘土的改性研究；(4)PEO／硅酸盐矿物微粒助留体系的机理研究。 通过对所做实验结果的分析和讨论，主要的研究结果如下：
1．凹凸棒粘土和锂基膨润土比其他无机粘土更适合与PEO构成助留助滤体系。当凹凸棒粘土的用量为4%，PEO为0.0196时，可以起到很好的助滤效果。PEO／凹凸棒粘土助留体系对高岭土、GCC和滑石粉均有较好的助留效果，但对滑石粉的助留效果最好。锂基膨润土0.5%，PEO0．01%时亦可以构成理想的助留体系，对成纸的白度有一定的增加。 2．PEO／凹凸棒粘土助留体系对纸张物理性能的影响表现为：抗张强度下降；白度下降了1-2个百分点；当滑石粉的用量为25%时，不透明度提高了近五个百分点；助留剂PEO的用量对匀度是没有影响的。 3．通过在助留助滤效果及成本增加等方面的比较：PEO／凹凸棒粘土体系优于PEO／锂基膨润土，优于Hydrocol助留体系。 4．纸机湿部系统的影响因素对PEO／凹凸棒粘土助留体系的助留助滤效果的影响表现为：pH值在2-12范围内，对助滤效果是没有影响的，使助留效果在酸性条件下较差，而在中碱性条件下较好；无机盐的存在使浆料的滤水性能有一定的改善，使助留效果有所削弱；木质素磺酸盐对助滤效果是没有影响的，使留着率下降了5—8%；木质素磺酸盐与聚木糖对助滤效果也是没有影响的，使留着率略有下降。 5．凹凸棒粘土可以通过插层方法进行改性。改性后粘土的用量从4%下降到1.5%，与PEO作用改善了浆料的滤水性能，且甲醛比苯酚先插层所得粘土对滤水性的改善效果好，但对纸张的白度影响较大。 6．PEO与凹凸棒粘土或锂基膨润土对纤维的留着机理是与层间的Li~+、Na~+、Ca~(2+)等离子进行插层作用，形成具有较强的抗剪切能力和凝胶特性的络合物，吸附在纤维和细料表面形成的絮团也具有较好的抗剪切性能，从而起到很好的助留助滤效果。综上所述，该非离子助留体系属于微粒助留体系。
In current papermaking industry, for saving fiber materials and fresh-water, a great deal of high-yield pulps, deinking pulps and coating brakes were used, and the close degree of white water circulation was enhanced. Which made more and more dissolved and colloidal substances (DCS) accumulate in wet end of paper machine and these substances will damage stability of wet end operation system. Therefore, not only the applicable areas and effects of cationic microparticle retention system were restricted, but also its drainage and retention efficiencies cannot be exerted fully. In addition, the efficiencies of other additives will be likely affected in the wet end. In order to solve these questiones, it is planed to be developed that a new nonionic microparticle retention system to make up the shortages of the existing retention system. And the flocculation mechanism was investigated too.Nonionic microparticle retention system of PEO/silicate was investigated in this paper, including: (1) Study of PEO/silicate microparticle retention system; (2) Influencing factors of PEO/attapulgite microparticle retention system; (3) Research of attapulgite modification; (4) Research of flocculation mechanism of PEO/silicate microparticle retention system.Many results are obtained through analysis and discussing of test data. The main results are as follows:1 .Attapulgite and Li-bentonite are more suitable for building retention system with PEO than other inorganic clays. When the dosage of attapulgite was 4% and PEO was 0.01%, they had better drainage efficiency. PEO/attapulgite retention system had good retention efficiencies on Kaolin clay, grounded calcium carbonate (GCC) and talc. And talc is best of all. When its dosage was 0.5%, Li-bentonite could be built better retention system with PEO, increasing paper"s brightness somewhat.2.The effects of PEO/attapulgite retention system on physical performances are: tensile strength of paper sheets declined; brightness decreased 1-2%; when talc dosage was 25%, opacity was increased about 5%; And there is no effect of PEO dosage on formation.3.The PEO/attapulgite retention system is superior to the PEO/Li-bentonite retention system, and is superior to the Hydrocol retention system too, compared from the same drainage and retention effect, and product cost etc.4.The effects of many factors in the wet end on drainage and retention of PEO/attapulgitesystem: During the scope of 2-12, pH has no effect on drainage, and retention ratio lower in acidic conditions and higher in neutral or alkaline conditions. There were some improvement on slurry"s drainage and some impairment on retention efficiency for the existence of inorganic salts. Lignosulphonate had no effect on drainage and made retention ratio decrease 5-8%; lignosulphonate and xylan had no effect on drainage and made retention ratio decrease a little.5 .Attapulgite could be modified by intercalation. And modified attapulgite dosage was decreased from 4% to 1.5%. Slurry"s drainage was improved by PEO and modified attapulgite. Furthermore, the clay intercalated with formaldehyde first is better than that intercalated with phenol first. But the modified attapulgite had strongly effect on paper"s brightness.6.The retention mechanism of PEO, attapulgite or Li-bentonite and fibers is that PEO and intercalary ions of clay, e.g. Li+, Na+, Ca2+, intercalated and formed association complex. This complex has gel property and better shear-resistance. And it adsorbed onto the surfaces of fibers and fines to form floes. These floes had good shear-resistance too. Therefore, the PEO/attapulgite, PEO/Li-bentonite retention system had good performances of drainage and retention aid. Summing up all conclusions above, this nonionic retention system belongs to microparticle retention system.

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