Preparation of a waterproofing fatliquoring agent and its application on the suede split bovine leather

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Introduction

- A novel waterproof fatliquoring agent (WR) is prepared and applied in the production of suede split bovine leather.
- WR is obtained by mixing the polyacrylate with polysiloxane. The polyacrylate copolymer is synthesized by free radical copolymerization reaction using stearyl acrylate and acrylic acid as the raw materials and azodiisobutyronitrile (AIBN) as the initiator.
- The structure of the copolymer has been characterized by FTIR and ^{1}H NMR.
- The physical and chemical properties of WR is determined, and its application in the production of suede split bovine leather has been investigated .

Preparation of WR

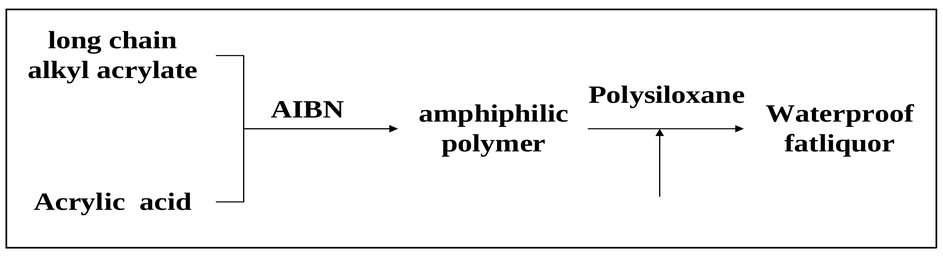

Fig .1 Preparation route of waterproof fatliquoring agent (WR)

Results and discussion

Tab. 1 Influence of composition on amphiphilic polymer performance

Ratio of monomer（%）	dosage(%)	Water absorption 24h/%	Dynamic waterproofing times	Thickening rate/%	Rate of area change/%
60	10	53.21	9517	8.54	7.90
70	10	39.18	17211	7.66	8.00
75	10	38.50	26041	9.75	7.00

- With the increase of hydrophobic group proportion in polymer composition,the 24h water absorption decreased and the dynamic waterproofing times increased.

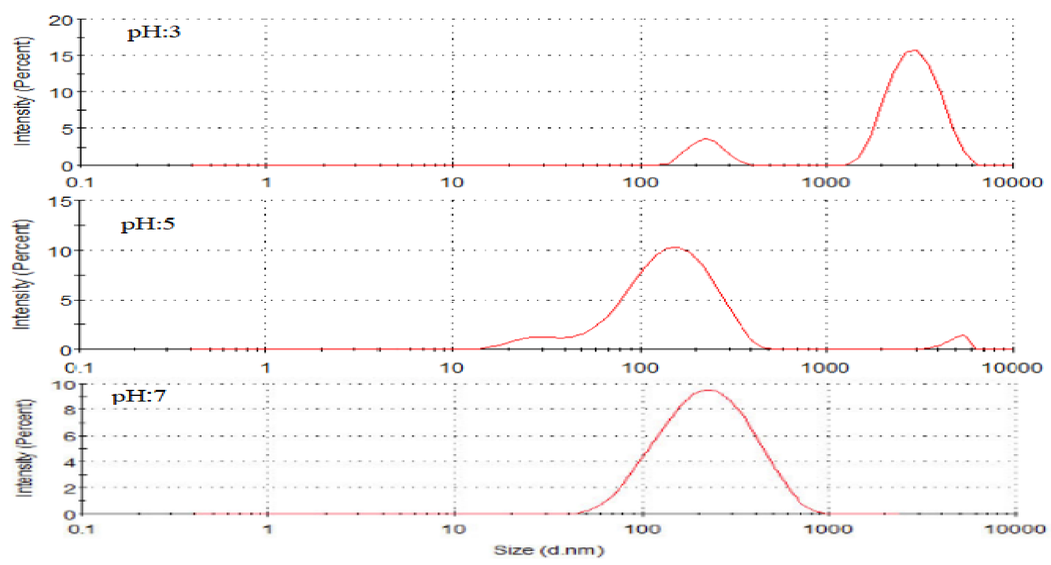

Fig.2 the Particle size distribution of emulsion under different pH conditions

- Waterproof fatliquoring agent has high sensitivity to pH. In order to the penetration, the neutralization degree of the crust should be controlled between 6 to 7 . The pH of crust should be reduced to the fixation at the end of fatliquoring.

Tab.2 The moisture permeability of crust treated with different products

Sample	WR	SS	WP	TBD
Water vapor permeability(mg/cm^2.h)	12.99	13.12	11.69	13.09
water-vapour absorption（mg/cm^2）	0.76	0.72	0.75	0.8
Water vapor coefficient（mg/cm^2）	104.68	104.7	94.27	105.52

- The moisture permeability of the crust treated with WR is similar to that of the sample treated with common fatliquor, indicating that the WR has little influence on the moisture permeability of leather.

Tab. 3 The area change rate of the leather after washing

	Before washing	1 time	2 times	3 times	4 times	5 times
area/cm^3	200	200.48	200.67	200.73	200.96	201.26
the area change rate	—	0.24	0.34	0.37	0.48	0.63

- The change rate of crust area was low in the process of washing.This shows that the prepared waterproof fatliquoring agent has good water resistance and strong interaction with the fiber

Fig.3 The contact Angle of crust treated with WR

- When the dosage of waterproofing agent WR is 5%, 10% and 15% respectively, the contact angles of two-layer suede leather are 144.5°, 147.6° and 154.3° .

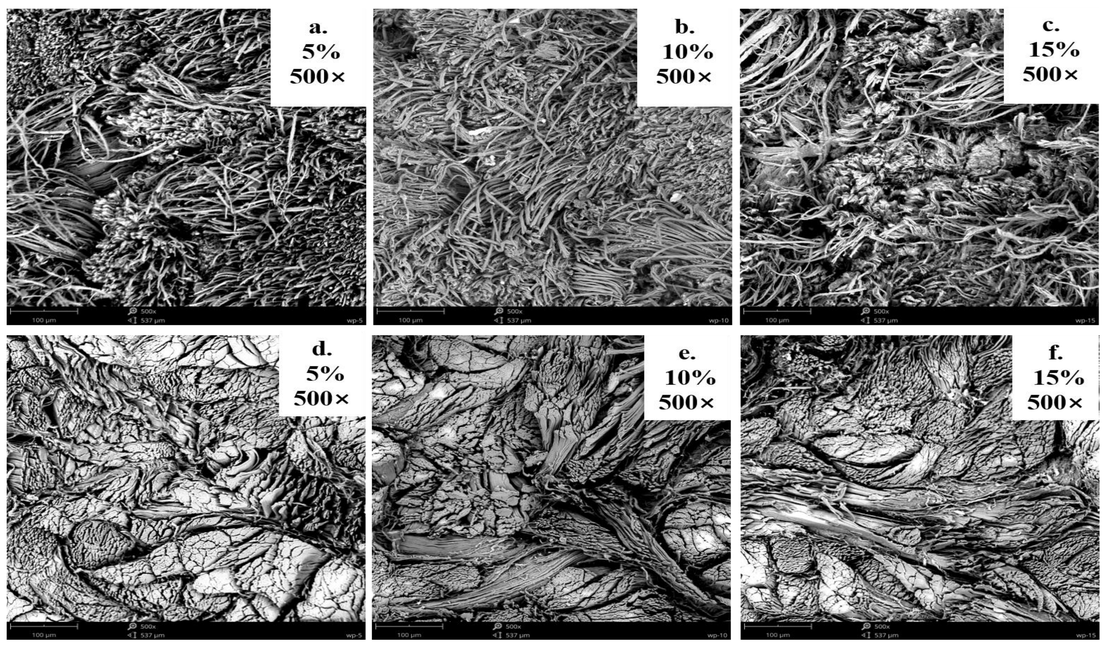

Fig.4 The SEM photos of the surface (A, B, C) and section (D, E, F) of the suede split leather after treatment

- After WR treatment, the collagen fibers were fully dispersed.

Fig.5 The manufactured goods of cow suede shoe waterproof leather

Conclusion

- A novel waterproof fatliquoring agent (WR) is prepared and characterized. The application research shows that this product has good application performance.
- WR was used to produce the suede split shoe waterproof leather since 2019. Up until now, the cumulative output is 9 million square feet.

Acknowledgement

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