Experiment Research on the Light Radiating Fur-Stripping Based on Artificial Light Source

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Abstract: The high pressure hydrarqyrum lamp(for short HH-L), commonly incandescence lamp(CI-L), infrared lamp(I-L) and ultraviolet lamp(U-L) were applied as artificial light source to make light radiating stripping experiments of the different dyeing fur. The stripping effect of different light source, seeing about connection of stripping temperature and stripping time with dyeing fur stripping white degree were contrasted and analyzed. The research conclusions are following:(1) fur depigment to white can be achieved by the artificial light sources entirely, but the type of light source and electricity-parameters must be selected; (2)compare with one of sun's rays or steam, the artificial light source can attained short stripping-time. The stripping processes were handled and controlled easily. Stripping production efficiency was higher; (3)moment strong hot radiation was the most important factor of affecting stripping-rate and white degree; the HH-L was perfect stripping light source.

Key words: fur; fur-stripping; artificial light source; light-radiating stripping

1 Introduction

The fur-stripping is foundation to make fashion color fur as the "snow top", "one-fur and multicolor" and "stripping printing" domino offect. Traditional sun's rays-stripping is limited by the weather condition, and that have shortage of unstable quality, long stripping time as well as low work efficiency. Ordinary vapour stripping needs to control shrinkage temperature of fur, and that have disadvantage of hazard of burning-skin, unstable quality and high energy cost.

For present being questions, the HH-L, CI-L, I-L and U-L were applied as artificial light source to make light radiating stripping experiments of the different dyeing fur.

2 Experimental

2.1 Materials

Dibubol WA(industry) was supplied by Hebei Yongtai Chemicals Co.,Ltd.

Formic acid(94%) was supplied by BASF.

Tanning and dyeing rabbit fur.

2.2 Experimental Device and Apparatus

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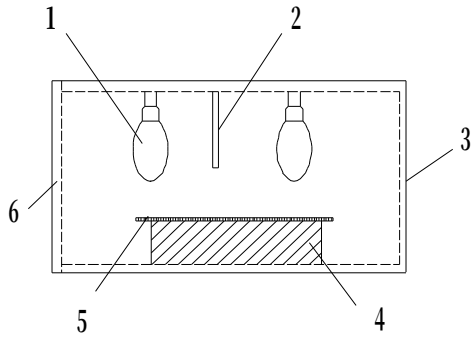
The stripping box is shown in Fig. 1. It is made in wood block with 50cm×50cm×30cm. And the box's front face, top face, left face and right face had been glassed.



1-light source 2-thermometer 3- box's body 4-supporting board 5-fur 6-movable door

Fig. 1 Stripping box

Fur-stripping light source: CI-L, HH-L, I-L, U-L. That technology parameter is shown in Tab.1.

Tab. 1 Light sources technology parameter

Light Source	Power (W)	Luminous flux (Im)	Light effect (Im/ W)	Color temperature (K)
CI-L	125	1560	50	3150
HH-L	125	2750	50	4150
I-L	125	—	—	4500
U-L	125	—	—	—

WSB-3A stripping-white degree apparatus by Shanghai precision apparatus & meter co., ltd , Calculagraph.

2.3 Experimental Process

2.3.1 Preparation of Fur-stripping Reagent

Project 1: Dibubol WA：formic acid：water= 100：400：600 (standard preparation)

Project 2: Dibubol WA：formic acid：water= 100：400：400 (few water)

Project 3: Dibubol WA：formic acid：water= 100：400：800 (much water)

2.3.2 Fur-stripping Test

Using the "snow top" dyestuff, the rabbit furs are dyed to red and black. To cut the fur into size10 cm×10cm, and brush the small piece fur-stripping reagent on fur's end, then move them into the stripping box to make light radiating stripping experiment. Through the glass windows, to observe these furs display different extent white, and record stripping temperature and stripping time. When the white furs are taken out the stripping box, let's make sure them ventilation about five minutes, and in succession to test their white degree with stripping-white degree apparatus.

3 Results and discussion

The test results are shown in Tab.2, Tab.3, Fig.2, Fig.3, Fig.4 and Fig.5.

Tab.2 Red color fur-stripping experiment data

Time（s）	30	60	90	120	150	180	210	240	270	300
Light Source & temperature	White degree									
HH-L(42℃)	46.81	73.70	74.61	77.13	77.26	77.07	76.94	75.74	74.89	73.49
CI-L (42℃)	44.51	71.31	73.27	74.01	74.55	75.06	74.18	73.64	73.31	72.86
I-L (42℃)	45.18	70.91	72.8	73.46	73.80	74.21	75.41	75.32	74.57	73.06
I-L (65℃)	48.86	71.47	73.02	73.91	74.91	75.69	75.30	74.75	73.97	72.12
I-L (75℃)	50.19	71.88	73.45	74.61	74.40	73.94	73.81	73.51	72.11	71.89
I-L (85℃)	52.92	72.01	74.12	75.12	74.79	74.42	73.24	72.21	72.04	71.48
U-L (20℃)	—	—	—	—	—	—	—	—	—	—

Remark: "—"denotation that the red color fur strip phenomenon is not evidence in the low temperature conditions of U-L. The standard white degree R459 is 75.89 about white degree apparatus's white degree board.

Tab. 3 Black fur-stripping experiment data

Time（s）	30	60	90	120	150	180	210	240	270	300
Light Source & temperature	White degree									
HH-L (25℃)	45.11	57.98	58.29	59.43	61.55	61.88	62.01	62.48	62.24	60.69
HH-L (42℃)	48.81	60.41	61.32	61.53	63.88	64.03	63.52	62.16	61.84	60.18
CI-L (42℃)	47.12	56.05	57.12	58.34	61.18	62.01	61.89	61.33	59.89	58.06
I-L (42℃)	46.31	55.12	56.04	57.49	59.01	61.26	61.48	61.19	60.13	58.27
I-L (65℃)	49.92	55.93	56.69	58.23	60.47	61.68	61.12	58.82	57.41	56.65
I-L (75℃)	52.92	56.51	57.31	58.74	61.51	61.21	59.28	58.33	57.12	55.81
I-L (85℃)	55.38	57.42	58.94	60.36	60.02	59.89	57.11	56.71	56.23	53.90
U-L (20℃)	—	—	—	—	—	—	—	—	—	—

Remark: "—" denotation that the black color fur strip phenomenon is not evidence in the low temperature conditions of U-L.

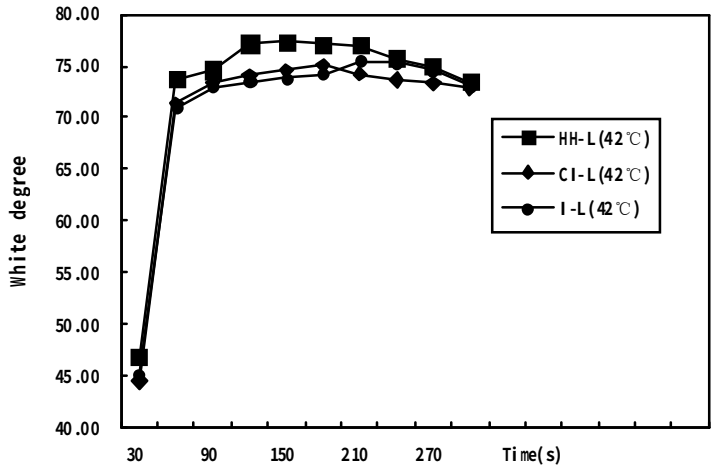


Fig.2 Red Fur-stripping time-white curve in same temperature and different light sources

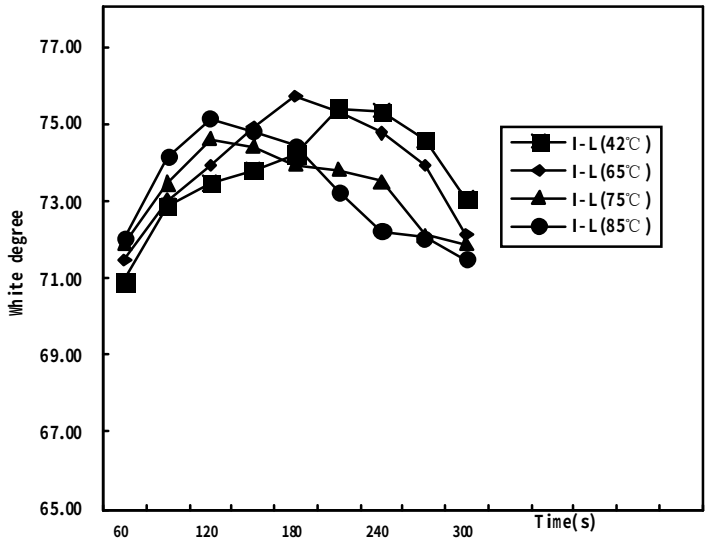


Fig.3 Red Fur-strip time-white curve in same light sources and different temperature

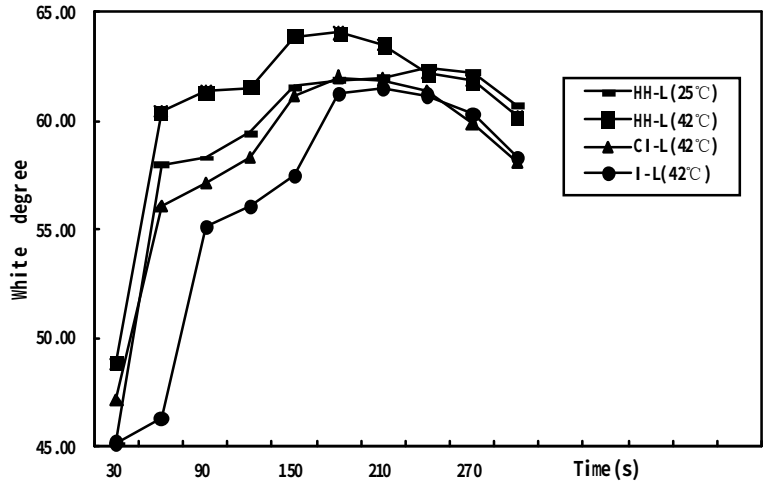


Fig.4 Black fur-stripping time-white curve in same temperature and different light sources

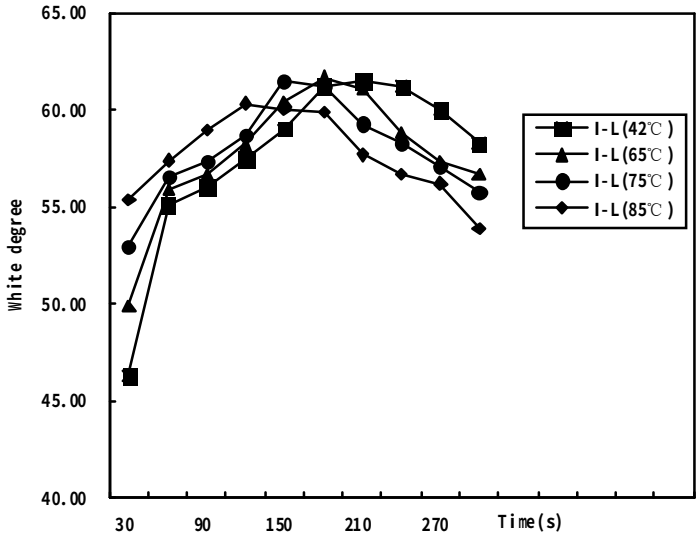


Fig.5 Black fur-stripping time-white curve in same light sources and different temperature

By the experiment, some results can be got through analyzing Tab.2, Tab.3, Fig.2, Fig.3, Fig.4 and Fig.5.

1) In conditions of different light sources and same temperature, the red and black color dyeing furs had been made light radiating stripping experiment. All of fur-stripping reagents can make furs become white only having different stripping-white degree and different stripping-rate.

2）At the same temperature (42℃), the stripping quality of HH-L was the best in four artificial light sources, which can achieve stripping white degree 77.26. And CI-L can achieve 75.06, I-L can achieve75.41. One of U-L was worst because of hardly any radiating.

3) At the same temperature (42℃), the stripping rate of HH-L was the most rapidness in four artificial light sources, and its stripping time was about 150 seconds for red fur. And I-L may need 210 seconds; CI-L may need 180 seconds.

4) Using I-L to strip at different temperatures (42℃, 65℃, 75℃, 85℃), stripping time was short and stripping white degree rose as temperature hoist. The phenomenon indicated that temperature was one of the factors of affecting fur-stripping white degree and stripping rate.

5）Using the microscope to observe the I-L (85℃) stripping fur, fur's end had yellow tendency when the stripping time passed 210 seconds. So it was proved that long stripping time would damage fur and decrease stripping quality.

6) Using I-L to strip no matter what temperature, the Stripping time-white curve looks like an opening downward parabola. The stripping white degree can get the most value at sometime then gradual decline. So it was proved that the stripping time of obtaining optimal stripping quality was assured under certain conditions, a long time not only hardly advance white degree but also reduce the value.

7）To strip black color fur at the same conditions, the stripping white degree and stripping rate were inferior than stripping red color fur. So it was proved the darker the less stripping.

8）From the Tab.1, it was known that HH-L can get higher stripping quality and faster stripping rate since HH-L had greater luminous flux and higher color temperature. What's more, luminous flux and temperature play an important role of radiating and actinochemistry for stripping. At the same time the stripping temperature higher, the stripping time shorter. Thereby hot radiating and temperature are the mostly factors for affecting stripping rate.

9）Using HH-L to strip red fur with different fur-stripping reagent (project 1,2,3) at the same temperature (42℃). The result were that the fur become white quickly with reagent of project 1, with reagent of project 2 and 3 had little white color or unnoticeable phenomenon. This was known that fur-stripping reagent's water was certain influence for stripping process and result. The water can diffuse medium in dyestuff actinochemistry reaction, but fewer water make against molecule freedom group's diffusion, and more water can dilute fur-stripping reagent's thickness, accordingly improper water will reduce stripping effect.

4 Conclusions

1) Using artificial light source can completely strip white dyed fur, but need select light source type and its' electricity parameter. The HH-L with greater luminous flux and higher color temperature is almost ideal stripping light source.

2) Moment strong hot radiating and higher stripping temperature are the major factors to affect stripping rate and stripping white degree. The appropriate fur-stripping temperature of light radiating is 42℃-85℃. Rising stripping temperature can short stripping time, and improve stripping white degree.

3) No matter what light sources and stripping conditions, the fitting fur-stripping time is 150-190 seconds about artificial light source radiating stripping.

4) Comparatively sun rays and steam stripping, artificial light source radiating stripping can evidently short stripping time. Also the method has some traits such as simple stripping process, easy to control, and higher stripping production rate.

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