component). Also, by using the obtained photochromic composition, the photochromic laminated article was produced as same method as example 84.

[0292]

The evaluation results of the obtained various photochromic laminated article are shown in Table 15 and Table 16. In these examples, when the infrared absorption spectrum of the photochromic adhesive sheet was verified, the peak of the isocyanate group decreased in all sheets, thus it was confirmed that various isocyanate group used were reacting.

[0293]

[Table 11]

	A component		B component		C component		Other		The film thickness (μm)	The photochromic charcteristics				The release strength (N/25mm)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)		λmax	The color optical density	The color fading speed	The durability	
Example 1	U1	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.0	90	90	30
Example 2	U2	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.1	50	90	30
Example 3	U3	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.1	40	85	30
Example 4	U4	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.0	80	95	60
Example 5	U5	5	PC1	0.25	C3	20	TINUVIN765	0.25	30	585	1.1	55	96	60
Example 6	U6	5	PC1	0.25	C4	20	TINUVIN765	0.25	30	585	1.1	45	92	60
Example 7	U7	5	PC1	0.25	C5	20	TINUVIN765	0.25	30	585	1.2	40	82	50
Example 8	U8	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	80	95	50
Example 9	U9	5	PC1	0.25	C7	20	TINUVIN765	0.25	30	585	1.1	50	88	38
Example 10	U10	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.0	55	93	50
Example 11	U11	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.0	90	93	28
Example 12	U12	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.1	50	94	30
Example 13	U13	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.1	40	88	30
Example 14	U14	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	80	98	60
Example 15	U15	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.1	55	98	60
Example 16	U16	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.1	45	94	60
Example 17	U17	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.2	40	85	50
Example 18	U18	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	80	95	50
Example 19	U19	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.1	50	92	40
Example 20	U20	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.0	55	94	50

[0294]

[Table 12]

	A component		B component		C component		Other		The film thickness (μm)	The photochromic charcteristics				The release strength (N/25mm)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)		λmax	The color optical density	The color fading speed	The durability	
Example 21	U21	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	50	98	60
Example 22	U22	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	40	92	50
Example 23	U23	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	0.9	60	85	50
Example 24	U24	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	40	97	55
Example 25	U25	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	0.9	75	98	45
Example 26	U26	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	0.9	65	98	50
Example 27	U27	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.2	40	95	50
Example 28	U28	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.2	35	90	45
Example 29	U29	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.2	35	85	40
Example 30	U30	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.1	60	98	55
Example 31	U31	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.2	45	96	50
Example 32	U32	5	PC1	0.25	C3/C4/C5	12/7/1	TINUVIN765	0.25	30	585	1.0	60	92	45
Example 33	U33	5	PC1	0.25	C3/C4/C5	12/7/1	TINUVIN765	0.25	30	585	1.2	45	93	43
Example 34	U34	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	60	90	42
Example 35	U35	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	60	88	43
Example 36	U36	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	60	97	55
Example 37	U37	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.2	70	95	50
Example 38	U38	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	0.7	150	98	40
Example 39	U39	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.2	35	70	30
Example 40	U40	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.2	30	70	30
Example 41	U41	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	0.6	180	95	35
Example 42	U27	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	TINUVIN765/ Irganox245	0.25/0.05	30	570	1.1	45	97	50
Example 43	U27	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	TINUVIN765/ Irganox245	0.25/0.05	30	570	1.1	45	98	50

[0295]

[Table 13]

	A component		B component		C component		Other		The film thickness (μm)	The photochromic charcteristics				The release strength (N/25mm)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)		λmax	The color optical density	The color fading speed	The durability	
Example 44	Z1	5	PC1	0.25	C1	20	–	–	30	585	1.0	90	95	60
Example 45	Z2	5	PC1	0.25	C1	20	–	–	30	585	1.1	50	94	65
Example 46	Z3	5	PC1	0.25	C1	20	–	–	30	585	1.1	40	88	65
Example 47	Z4	5	PC1	0.25	C2	20	–	–	30	585	1.0	80	98	75
Example 48	Z5	5	PC1	0.25	C2	20	–	–	30	585	1.1	55	98	85
Example 49	Z6	5	PC1	0.25	C2	20	–	–	30	585	1.1	45	94	85
Example 50	Z7	5	PC1	0.25	C2	20	–	–	30	585	1.2	40	85	80
Example 51	Z8	5	PC1	0.25	C2	20	–	–	30	585	1.0	70	95	70
Example 52	Z9	5	PC1	0.25	C2	20	–	–	30	585	1.1	50	92	70
Example 53	Z10	5	PC1	0.25	C2	20	–	–	30	585	1.0	50	98	65
Example 54	Z11	5	PC1	0.25	C2	20	–	–	30	585	1.0	40	92	65
Example 55	Z12	5	PC1	0.25	C2	20	–	–	30	585	0.9	60	88	65
Example 56	Z13	5	PC1	0.25	C2	20	–	–	30	585	0.9	75	98	85
Example 57	Z14	5	PC1	0.25	C2	20	–	–	30	585	0.9	65	98	80
Example 58	Z15	5	PC1	0.25	C6	20	–	–	30	585	1.2	40	95	80
Example 59	Z16	5	PC1	0.25	C3/C5/C6	7/1/12	–	–	30	585	1.2	35	93	70
Example 60	Z17	5	PC1	0.25	C4/C5/C6	9/1/10	–	–	30	585	1.2	35	90	65
Example 61	Z18	5	PC1	0.25	C2	20	–	–	30	585	1.1	60	98	65
Example 62	Z19	5	PC1	0.25	C2	20	–	–	30	585	1.2	45	96	70
Example 63	Z20	5	PC1	0.25	C2	20	–	–	30	585	1.0	60	98	70
Example 64	Z21	5	PC1	0.25	C2	20	–	–	30	585	1.2	45	97	65
Example 65	Z22	5	PC1	0.25	C2	20	–	–	30	585	1.0	60	97	65
Example 66	Z23	5	PC1	0.25	C2	20	–	–	30	585	1.0	50	98	85
Example 67	Z24	5	PC1	0.25	C2	20	–	–	30	585	1.0	50	97	85
Example 68	Z25	5	PC1	0.25	C2	20	–	–	30	585	1.0	50	92	80
Example 69	Z26	5	PC1	0.25	C2	20	–	–	30	585	1.0	50	98	70
Example 70	Z27	5	PC1	0.25	C2	20	–	–	30	585	1.1	45	80	55
Example 71	Z28	5	PC1	0.25	C2	20	–	–	30	585	1.1	50	98	24
Example 72	Z29	5	PC1	0.25	C2	20	–	–	30	585	1.1	50	98	65
Example 73	Z30	5	PC1	0.25	C2	20	–	–	30	585	1.0	60	98	65

[0296]

[Table 14]

	A component		B component		C component		Other		The film thickness (μm)	The photochromic charcteristics				The release strength (N/25mm)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)		λmax	The color optical density	The color fading speed	The durability	
Example 74	Z31	5	PC1	0.25	C1	20	–	–	30	585	1.1	50	94	65
Example 75	Z32	5	PC1	0.25	C2	20	–	–	30	585	1.1	45	98	85
Example 76	Z33	5	PC1	0.25	C2	20	–	–	30	585	0.9	83	98	85
Example 77	Z34	5	PC1	0.25	C2	20	–	–	30	585	0.9	85	98	85
Example 78	Z35	5	PC1	0.25	C2	20	–	–	30	585	1.1	55	92	80
Example 79	Z36	5	PC1	0.25	C2	20	–	–	30	585	1.0	55	91	80
Example 80	Z39	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	–	–	30	570	1.1	45	97	90
Example 81	Z39	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	Irganox245	0.05	30	570	1.1	45	99	90
Example 82	Z40	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	–	–	30	570	1.1	47	97	85
Example 83	Z40	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	Irganox245	0.05	30	570	1.1	48	99	85

[0297]

[Table 15]

Example No.	A component		B component		D component		C component		Other		The photochromic charcteristics				The release strength (N/25mm)		The heat resistance (℃)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	λmax	The color optical density	The color fading speed	The durability	The initial	After the boiling test	
Example 84	W1	5	PC1	0.25	D1	0.15	C1	20	–	–	585	1.0	90	94	80	70	130
Example 85	W2	5	PC1	0.25	D1	0.15	C1	20	–	–	585	1.1	50	92	90	80	135
Example 86	W3	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	80	98	120	110	150
Example 87	W4	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	55	98	130	115	145
Example 88	W5	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	45	94	130	120	145
Example 89	W6	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.2	40	85	120	110	130
Example 90	W7	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	70	94	120	110	140
Example 91	W8	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	50	90	90	80	135
Example 92	W9	5	PC1	0.25	D1	0.15	C1	20	–	–	585	1.1	50	94	110	105	140
Example 93	W10	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	50	98	85	80	135
Example 94	W11	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	40	92	90	80	120
Example 95	W12	5	PC1	0.25	D1	0.15	C2	20	–	–	585	0.9	60	88	80	65	130
Example 96	W13	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	45	98	105	100	150
Example 97	W14	5	PC1	0.25	D1	0.15	C2	20	–	–	585	0.9	75	98	90	85	150
Example 98	W15	5	PC1	0.25	D2	0.15	C2	20	–	–	585	0.9	65	98	90	80	150
Example 99	W16	5	PC1	0.25	D2	0.15	C6	20	–	–	585	1.2	40	95	110	100	110
Example 100	W17	5	PC1	0.25	D1	0.15	C3/C5/C6	7/1/12	–	–	585	1.2	35	93	90	80	100
Example 101	W18	5	PC1	0.25	D1	0.15	C4/C5/C6	9/1/10	–	–	585	1.2	35	90	80	70	90
Example 102	W19	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	60	98	115	105	140
Example 103	W20	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.2	45	96	110	105	130
Example 104	W21	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	60	98	95	90	135
Example 105	W22	5	PC1	0.25	D1	0.15	C6	20	–	–	585	1.2	45	97	90	80	130
Example 106	W23	5	PC1	0.25	D1	0.15	C6	20	–	–	585	1.0	60	97	85	75	140
Example 107	W24	5	PC1	0.25	D1	0.15	C6	20	–	–	585	0.9	83	98	120	110	130
Example 108	W25	5	PC1	0.25	D1	0.15	C6	20	–	–	585	0.9	85	98	110	105	125
Example 109	W26	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	50	92	110	100	135
Example 110	W27	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	50	98	90	80	125
Example 111	W28	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	46	90	110	100	140

[0298]

[Table 16]

A component		B component		D component		C component		Other		The photochromic charcteristics				The release strength (N/25mm)		The heat resistance (℃)
Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	λmax	The color optical density	The color fading speed	The durability	The initial	After the boiling test	
W5	5	PC1	0.25	D1	0.004	C2	20	–	–	585	1.1	55	98	90	85	130
W5	5	PC1	0.25	D1	0.02	C2	20	–	–	585	1.1	55	98	100	95	130
W5	5	PC1	0.25	D1	0.5	C2	20	–	–	585	1.1	60	91	110	100	150
W5	5	PC1	0.25	D1	0.9	C2	20	–	–	585	1.1	65	86	105	85	160
W5	5	PC1	0.25	D2	0.18	C6	20	–	–	585	1.1	54	98	120	110	140
W5	5	PC1	0.25	D3	0.11	C6	20	–	–	585	1.1	52	98	120	115	140
W5	5	PC1	0.25	D4	0.13	C6	20	–	–	585	1.1	56	92	110	90	150
W5	5	PC1	0.25	D5	0.34	C6	20	–	–	585	1.1	55	98	120	110	135
W5	5	PC1	0.25	D6	0.53	C6	20	–	–	585	1.1	55	98	110	100	135
W5	5	PC1	0.25	D7	1.53	C6	20	–	–	585	1.1	50	95	90	70	120
W29	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	–	–	570	1.1	45	97	130	120	130
W29	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	Irganox245	0.05	570	1.1	45	99	130	120	130
W30	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	–	–	570	1.1	48	97	120	110	140
W30	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	Irganox245	0.05	570	1.1	49	99	120	110	135
W31	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	–	–	570	1.1	41	97	100	90	110
W31	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	Irganox245	0.05	570	1.1	42	99	100	90	105

[0299]

Comparative examples 1 to 7

The preparation of the photochromic composition and the production of the photochromic laminated article were carried out as the same method as the example 1, except for using the polyurethane-urea resin, the photochromic compound and the organic solvent a shown in Table 17. The evaluation results of the obtained various photochromic multilayer bodies are shown in Table 17.

[0300]

[Table 17]

	A component		B component		C component		Additives		The film thickness (μm)	The photochromic charcteristics				The release strength (N/25mm)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)		λmax	The color optical density	The color fading speed	The durability	
Comparative example 1	U42	5	PC1	0.25	C6	20	-	-	30	585	1.1	70	90	20
Comparative example 2	U43	5	PC1	0.25	C6	20	-	-	30	585	0.9	100	90	20
Comparative example 3	U44	5	PC1	0.25	C6	20	-	-	30	585	1.2	45	70	15
Comparative example 4	U45	5	PC1	0.25	C6	20	-	-	30	585	1.1	65	85	15
Comparative example 5	U46	5	PC1	0.25	C6	20	-	-	30	585	0.9	100	60	20
Comparative example 6	Z37	5	PC1	0.25	C2	20	-	-	30	585	1.0	42	80	50
Comparative example 7	Z38	5	PC1	0.25	C2	20	-	-	30	585	1.1	38	60	20

[0301]

Comparative example 8

The polyurethane resin (I) comprising the isocyanate group in the terminal end of the molecular chain, and the polyurethane resin (II) comprising the hydroxyl group at the terminal end of the molecular chain were prepared as described in below.

[0302]

(The preparation of the polyurethane resin (I))

100g of polycaprolactonepolyol (Praccel made by DAICEL CORPORATION) having the number average molecular weight of 1000, 39.5g of 4,4'-methylenebis(cyclohexylisocyanate) were added into the three-necked flask having

a stirring blade, a cooling pipe, a thermometer, and nitrogen gas introducing pipe; and reacted for 6 hours at 90°C under the nitrogen atmosphere, thereby obtained the prepolymer (the polyurethane resin (I)) having the isocyanate group at the terminal end. The number average molecular weight of the obtained prepolymer (the polyurethane resin (I)) was 2500 in terms of polyoxyethylene (the theoretical value; 2800).

[0303]

(The preparation of the polyurethane resin (II))

100g of polycaprolactonepolyol (Praccel made by DAICEL CORPORATION) having the number average molecular weight of 1000, 61.3g of 4,4'-methylenebis(cyclohexylisocyanate) were added into the three-necked flask having a stirring blade, a cooling pipe, a thermometer, and nitrogen gas introducing pipe; and reacted for 6 hours at 90°C under the nitrogen atmosphere, thereby obtained the prepolymer having the isocyanate group at the terminal end. Then, after 200ml of DMF was added, 12.7g of 1,4-butanediol was dropped under the nitrogen atmosphere, and it was reacted for 24 hours at 90°C after the dropping was completed; thereby the polyurethane resin (II) having the hydroxyl group at the terminal end of the molecular chain was prepared. The number average molecular weight of the obtained polyurethane resin (II) was 20000 in terms of the polyoxyethylene (the theoretical value; 18000).

[0304]

By using, the polyurethane resin (I) and polyurethane resin (II) obtained in the above, THF (C6) as the organic solvent in the blending amount shown in Table 18, and 0.25g of the photochromic compound (PC1), the photochromic composition was prepared by the same method as example 84. Also, by using the obtained photochromic composition, the photochromic laminated article was produced by the same method as example 84.

[0305]

The evaluation results of the various obtained photochromic laminated article are shown in Table 18.

[0306]

[Table 18]

Comparative example No.	polyurethane resin		polyurethane resin		B component		C component		The photochromic charcteristics				The release strength (N/25mm)		The heat resistance (℃)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	λmax	The color optical density	The color fading speed	The durability	The initial	After the boiling test	
Comparative example 8	(I)	2.5	(II)	2.5	PC1	0.25	C6	20	587	1.1	50	60	80	40	80

[0307]

As clear from the above examples 1 to 43, the polyurethane resin prepared using the suitable ratio of the polyol compound (A1 component), the polyisocyante compound (A2 component), and the amino group containing compound (A3) in accordance with the present invention has excellent photochromic characteristic, the adhesive strength and the heat resistance.

[0308]

Further, as clear from the above examples 44 to 83, the polyurethane-urea resin prepared by using the suitable ratio of the functionalization compound (A4 component) comprising the piperidine structure, the hindered phenol structure, the triazine structure or the benzotriazol structure within the molecule, in addition to A1 to A3 components, has further excellent photochromic characteristic, the adhesive strength (the adhesion) and the heat resistance.

[0309]

Also, as clear from the above examples of 84 to 127, the photochromic composition mixed with the polyurethane-urea resin (A component), and the isocyanate compound (D component) according to the invention, has excellent photochromic characteristic, and the adhesive strength (the adhesion), and the heat resistance, and

component). Also, by using the obtained photochromic composition, the photochromic laminated article was produced as same method as example 84.

[0292]

The evaluation results of the obtained various photochromic laminated article are shown in Table 15 and Table 16. In these examples, when the infrared absorption spectrum of the photochromic adhesive sheet was verified, the peak of the isocyanate group decreased in all sheets, thus it was confirmed that various isocyanate group used were reacting.

[0293]

[Table 11]

	A component		B component		C component		Other		The film thickness (μm)	The photochromic charcteristics				The adhesive Strength (N/25mm)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)		λmax	The color optical density	The color fading speed	The durability	
Example 1	U1	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.0	90	90	30
Example 2	U2	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.1	50	90	30
Example 3	U3	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.1	40	85	30
Example 4	U4	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.0	80	95	60
Example 5	U5	5	PC1	0.25	C3	20	TINUVIN765	0.25	30	585	1.1	55	96	60
Example 6	U6	5	PC1	0.25	C4	20	TINUVIN765	0.25	30	585	1.1	45	92	60
Example 7	U7	5	PC1	0.25	C5	20	TINUVIN765	0.25	30	585	1.2	40	82	50
Example 8	U8	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	80	95	50
Example 9	U9	5	PC1	0.25	C7	20	TINUVIN765	0.25	30	585	1.1	50	88	38
Example 10	U10	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.0	55	93	50
Example 11	U11	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.0	90	93	28
Example 12	U12	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.1	50	94	30
Example 13	U13	5	PC1	0.25	C1	20	TINUVIN765	0.25	30	585	1.1	40	88	30
Example 14	U14	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	80	98	60
Example 15	U15	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.1	55	98	60
Example 16	U16	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.1	45	94	60
Example 17	U17	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.2	40	85	50
Example 18	U18	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	80	95	50
Example 19	U19	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.1	50	92	40
Example 20	U20	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.0	55	94	50

[0294]

[Table 12]

	A component		B component		C component		Other		The film thickness (μm)	The photochromic charcteristics				The adhesive strength (N/25mm)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)		λmax	The color optical density	The color fading speed	The durability	
Example 21	U21	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	50	98	60
Example 22	U22	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	40	92	50
Example 23	U23	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	0.9	60	85	50
Example 24	U24	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	40	97	55
Example 25	U25	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	0.9	75	98	45
Example 26	U26	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	0.9	65	98	50
Example 27	U27	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.2	40	95	50
Example 28	U28	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.2	35	90	45
Example 29	U29	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.2	35	85	40
Example 30	U30	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.1	60	98	55
Example 31	U31	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	1.2	45	96	50
Example 32	U32	5	PC1	0.25	C3/C4/C5	12/7/1	TINUVIN765	0.25	30	585	1.0	60	92	45
Example 33	U33	5	PC1	0.25	C3/C4/C5	12/7/1	TINUVIN765	0.25	30	585	1.2	45	93	43
Example 34	U34	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	60	90	42
Example 35	U35	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	60	88	43
Example 36	U36	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.0	60	97	55
Example 37	U37	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.2	70	95	50
Example 38	U38	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	0.7	150	98	40
Example 39	U39	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.2	35	70	30
Example 40	U40	5	PC1	0.25	C6	20	TINUVIN765	0.25	30	585	1.2	30	70	30
Example 41	U41	5	PC1	0.25	C2	20	TINUVIN765	0.25	30	585	0.6	180	95	35
Example 42	U27	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	TINUVIN765/ Irganox245	0.25/0.05	30	570	1.1	45	97	50
Example 43	U27	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	TINUVIN765/ Irganox245	0.25/0.05	30	570	1.1	45	98	50

[0295]

[Table 13]

	A component		B component		C component		Other		The film thickness (μm)	The photochromic charcteristics				The adhesive strength (N/25mm)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)		λmax	The color optical density	The color fading speed	The durability	
Example 44	Z1	5	PC1	0.25	C1	20	—	—	30	585	1.0	90	95	60
Example 45	Z2	5	PC1	0.25	C1	20	—	—	30	585	1.1	50	94	65
Example 46	Z3	5	PC1	0.25	C1	20	—	—	30	585	1.1	40	88	65
Example 47	Z4	5	PC1	0.25	C2	20	—	—	30	585	1.0	80	98	75
Example 48	Z5	5	PC1	0.25	C2	20	—	—	30	585	1.1	55	98	85
Example 49	Z6	5	PC1	0.25	C2	20	—	—	30	585	1.1	45	94	85
Example 50	Z7	5	PC1	0.25	C2	20	—	—	30	585	1.2	40	85	80
Example 51	Z8	5	PC1	0.25	C2	20	—	—	30	585	1.0	70	95	70
Example 52	Z9	5	PC1	0.25	C2	20	—	—	30	585	1.1	50	92	70
Example 53	Z10	5	PC1	0.25	C2	20	—	—	30	585	1.0	50	98	65
Example 54	Z11	5	PC1	0.25	C2	20	—	—	30	585	1.0	40	92	65
Example 55	Z12	5	PC1	0.25	C2	20	—	—	30	585	0.9	60	88	65
Example 56	Z13	5	PC1	0.25	C2	20	—	—	30	585	0.9	75	98	85
Example 57	Z14	5	PC1	0.25	C2	20	—	—	30	585	0.9	65	98	80
Example 58	Z15	5	PC1	0.25	C6	20	—	—	30	585	1.2	40	95	80
Example 59	Z16	5	PC1	0.25	C3/C5/C6	7/1/12	—	—	30	585	1.2	35	93	70
Example 60	Z17	5	PC1	0.25	C4/C5/C6	9/1/10	—	—	30	585	1.2	35	90	65
Example 61	Z18	5	PC1	0.25	C2	20	—	—	30	585	1.1	60	98	65
Example 62	Z19	5	PC1	0.25	C2	20	—	—	30	585	1.2	45	96	70
Example 63	Z20	5	PC1	0.25	C2	20	—	—	30	585	1.0	60	98	70
Example 64	Z21	5	PC1	0.25	C2	20	—	—	30	585	1.2	45	97	65
Example 65	Z22	5	PC1	0.25	C2	20	—	—	30	585	1.0	60	97	65
Example 66	Z23	5	PC1	0.25	C2	20	—	—	30	585	1.0	50	98	85
Example 67	Z24	5	PC1	0.25	C2	20	—	—	30	585	1.0	50	97	85
Example 68	Z25	5	PC1	0.25	C2	20	—	—	30	585	1.0	50	92	80
Example 69	Z26	5	PC1	0.25	C2	20	—	—	30	585	1.0	50	98	70
Example 70	Z27	5	PC1	0.25	C2	20	—	—	30	585	1.1	45	80	55
Example 71	Z28	5	PC1	0.25	C2	20	—	—	30	585	1.1	50	98	24
Example 72	Z29	5	PC1	0.25	C2	20	—	—	30	585	1.1	50	98	65
Example 73	Z30	5	PC1	0.25	C2	20	—	—	30	585	1.0	60	98	65

[0296]

[Table 14]

	A component		B component		C component		Other		The film thickness (μm)	The photochromic charcteristics				The adhesive strength (N/25mm)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)		λmax	The color optical density	The color fading speed	The durability	
Example 74	Z31	5	PC1	0.25	C1	20	—	—	30	585	1.1	50	94	65
Example 75	Z32	5	PC1	0.25	C2	20	—	—	30	585	1.1	45	98	85
Example 76	Z33	5	PC1	0.25	C2	20	—	—	30	585	0.9	83	98	85
Example 77	Z34	5	PC1	0.25	C2	20	—	—	30	585	0.9	85	98	85
Example 78	Z35	5	PC1	0.25	C2	20	—	—	30	585	1.1	55	92	80
Example 79	Z36	5	PC1	0.25	C2	20	—	—	30	585	1.0	55	91	80
Example 80	Z39	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	—	—	30	570	1.1	45	97	90
Example 81	Z39	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	Irganox245	0.05	30	570	1.1	45	99	90
Example 82	Z40	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	—	—	30	570	1.1	47	97	85
Example 83	Z40	5	PC1/PC2/PC3	0.03/0.04/0.18	C2	20	Irganox245	0.05	30	570	1.1	48	99	85

[0297]

[Table 15]

Example No.	A component		B component		D component		C component		Other		The photochromic charcteristics				The adhesive strength (N/25mm)		The heat resistance (℃)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	λmax	The color optical density	The color fading speed	The durability	The initial	After the boiling test	
Example 84	W1	5	PC1	0.25	D1	0.15	C1	20	–	–	585	1.0	90	94	80	70	130
Example 85	W2	5	PC1	0.25	D1	0.15	C1	20	–	–	585	1.1	50	92	90	80	135
Example 86	W3	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	80	98	120	110	150
Example 87	W4	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	55	98	130	115	145
Example 88	W5	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	45	94	130	120	145
Example 89	W6	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.2	40	85	120	110	130
Example 90	W7	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	70	94	120	110	140
Example 91	W8	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	50	90	90	80	135
Example 92	W9	5	PC1	0.25	D1	0.15	C1	20	–	–	585	1.1	50	94	110	105	140
Example 93	W10	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	50	98	85	80	135
Example 94	W11	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	40	92	90	80	120
Example 95	W12	5	PC1	0.25	D1	0.15	C2	20	–	–	585	0.9	60	88	80	65	130
Example 96	W13	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	45	98	105	100	150
Example 97	W14	5	PC1	0.25	D1	0.15	C2	20	–	–	585	0.9	75	98	90	85	150
Example 98	W15	5	PC1	0.25	D2	0.15	C2	20	–	–	585	0.9	65	98	90	80	150
Example 99	W16	5	PC1	0.25	D2	0.15	C6	20	–	–	585	1.2	40	95	110	100	110
Example 100	W17	5	PC1	0.25	D1	0.15	C3/C5/C6	7/1/12	–	–	585	1.2	35	93	90	80	100
Example 101	W18	5	PC1	0.25	D1	0.15	C4/C5/C6	9/1/10	–	–	585	1.2	35	90	80	70	90
Example 102	W19	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	60	98	115	105	140
Example 103	W20	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.2	45	96	110	105	130
Example 104	W21	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	60	98	95	90	135
Example 105	W22	5	PC1	0.25	D1	0.15	C6	20	–	–	585	1.2	45	97	90	80	130
Example 106	W23	5	PC1	0.25	D1	0.15	C6	20	–	–	585	1.0	60	97	85	75	140
Example 107	W24	5	PC1	0.25	D1	0.15	C6	20	–	–	585	0.9	83	98	120	110	130
Example 108	W25	5	PC1	0.25	D1	0.15	C6	20	–	–	585	0.9	85	98	110	105	125
Example 109	W26	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	50	92	110	100	135
Example 110	W27	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.0	50	98	90	80	125
Example 111	W28	5	PC1	0.25	D1	0.15	C2	20	–	–	585	1.1	46	90	110	100	140

[0298]

[Table 16]

A component		B component		D component		C component		Other		The photochromic charcteristics				The adhesive strength (N/25mm)		The heat resistance (℃)
Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	λmax	The color optical density	The color fading speed	The durability	The initial	After the boiling test	
W5	5	PC1	0.25	D1	0.004	C2	20	–	–	585	1.1	55	98	90	85	130
W5	5	PC1	0.25	D1	0.02	C2	20	–	–	585	1.1	55	98	100	95	130
W5	5	PC1	0.25	D1	0.5	C2	20	–	–	585	1.1	60	91	110	100	150
W5	5	PC1	0.25	D1	0.9	C2	20	–	–	585	1.1	65	86	105	85	160
W5	5	PC1	0.25	D2	0.18	C6	20	–	–	585	1.1	54	98	120	110	140
W5	5	PC1	0.25	D3	0.11	C6	20	–	–	585	1.1	52	98	120	115	140
W5	5	PC1	0.25	D4	0.13	C6	20	–	–	585	1.1	56	92	110	90	150
W5	5	PC1	0.25	D5	0.34	C6	20	–	–	585	1.1	55	98	120	110	135
W5	5	PC1	0.25	D6	0.53	C6	20	–	–	585	1.1	55	98	110	100	135
W5	5	PC1	0.25	D7	1.53	C6	20	–	–	585	1.1	50	95	90	70	120
W29	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	–	–	570	1.1	45	97	130	120	130
W29	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	Irganox245	0.05	570	1.1	45	99	130	120	130
W30	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	–	–	570	1.1	48	97	120	110	140
W30	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	Irganox245	0.05	570	1.1	49	99	120	110	135
W31	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	–	–	570	1.1	41	97	100	90	110
W31	5	PC1/PC2/PC3	0.03/0.04/0.18	D1	0.25	C6/C7	8/12	Irganox245	0.05	570	1.1	42	99	100	90	105

[0299]

Comparative examples 1 to 7

The preparation of the photochromic composition and the production of the photochromic laminated article were carried out as the same method as the example 1, except for using the polyurethane-urea resin, the photochromic compound and the organic solvent a shown in Table 17. The evaluation results of the obtained various photochromic multilayer bodies are shown in Table 17.

[0300]

[Table 17]

	A component		B component		C component		Additives		The film thickness (μm)	The photochromic charcteristics				The adhesive strength (N/25mm)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)		λmax	The color optical density	The color fading speed	The durability	
Comparative example 1	U42	5	PC1	0.25	C6	20	-	-	30	585	1.1	70	90	20
Comparative example 2	U43	5	PC1	0.25	C6	20	-	-	30	585	0.9	100	90	20
Comparative example 3	U44	5	PC1	0.25	C6	20	-	-	30	585	1.2	45	70	15
Comparative example 4	U45	5	PC1	0.25	C6	20	-	-	30	585	1.1	65	85	15
Comparative example 5	U46	5	PC1	0.25	C6	20	-	-	30	585	0.9	100	60	20
Comparative example 6	Z37	5	PC1	0.25	C2	20	-	-	30	585	1.0	42	80	50
Comparative example 7	Z38	5	PC1	0.25,	C2	20	-	-	30	585	1.1	38	60	20

[0301]

Comparative example 8

The polyurethane resin (I) comprising the isocyanate group in the terminal end of the molecular chain, and the polyurethane resin (II) comprising the hydroxyl group at the terminal end of the molecular chain were prepared as described in below.

[0302]

(The preparation of the polyurethane resin (I))

100g of polycaprolactonepolyol (Praccel made by DAICEL CORPORATION) having the number average molecular weight of 1000, 39.5g of 4,4'-methylenebis(cyclohexylisocyanate) were added into the three-necked flask having

a stirring blade, a cooling pipe, a thermometer, and nitrogen gas introducing pipe; and reacted for 6 hours at 90°C under the nitrogen atmosphere, thereby obtained the prepolymer (the polyurethane resin (I)) having the isocyanate group at the terminal end. The number average molecular weight of the obtained prepolymer (the polyurethane resin (I)) was 2500 in terms of polyoxyethylene (the theoretical value; 2800).

[0303]

(The preparation of the polyurethane resin (II))

100g of polycaprolactonepolyol (Praccel made by DAICEL CORPORATION) having the number average molecular weight of 1000, 61.3g of 4,4'-methylenebis(cyclohexylisocyanate) were added into the three-necked flask having a stirring blade, a cooling pipe, a thermometer, and nitrogen gas introducing pipe; and reacted for 6 hours at 90°C under the nitrogen atmosphere, thereby obtained the prepolymer having the isocyanate group at the terminal end. Then, after 200ml of DMF was added, 12.7g of 1,4-butanediol was dropped under the nitrogen atmosphere, and it was reacted for 24 hours at 90°C after the dropping was completed; thereby the polyurethane resin (II) having the hydroxyl group at the terminal end of the molecular chain was prepared. The number average molecular weight of the obtained polyurethane resin (II) was 20000 in terms of the polyoxyethylene (the theoretical value; 18000).

[0304]

By using, the polyurethane resin (I) and polyurethane resin (II) obtained in the above, THF (C6) as the organic solvent in the blending amount shown in Table 18, and 0.25g of the photochromic compound (PC1), the photochromic composition was prepared by the same method as example 84. Also, by using the obtained photochromic composition, the photochromic laminated article was produced by the same method as example 84.

[0305]

The evaluation results of the various obtained photochromic laminated article are shown in Table 18.

[0306]

[Table 18]

Comparative example No.	polyurethane resin		polyurethane resin		B component		C component		The photochromic charcteristics				The adhesive strength (N/25mm)		The heat resistance (℃)
	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	Type	The added amount (g)	λmax	The color optical density	The color fading speed	The durability	The initial	After the boiling test	
Comparative example 8	(I)	2.5	(II)	2.5	PC1	0.25	C6	20	587	1.1	50	60	80	40	80

[0307]

As clear from the above examples 1 to 43, the polyurethane resin prepared using the suitable ratio of the polyol compound (A1 component), the polyisocyante compound (A2 component), and the amino group containing compound (A3) in accordance with the present invention has excellent photochromic characteristic, the adhesive strength and the heat resistance.

[0308]

Further, as clear from the above examples 44 to 83, the polyurethane-urea resin prepared by using the suitable ratio of the functionalization compound (A4 component) comprising the piperidine structure, the hindered phenol structure, the triazine structure or the benzotriazol structure within the molecule, in addition to A1 to A3 components, has further excellent photochromic characteristic, the adhesive strength (the adhesion) and the heat resistance.

[0309]

Also, as clear from the above examples of 84 to 127, the photochromic composition mixed with the polyurethane-urea resin (A component), and the isocyanate compound (D component) according to the invention, has excellent photochromic characteristic, and the adhesive strength (the adhesion), and the heat resistance, and

CLAIMS

~~1. A photochromic composition comprising (A) a polyurethane-urea resin having an urea bond in a molecular chain and (B) a photochromic compound.~~

~~2. The photochromic composition as set forth in claim 1, wherein said (A) polyurethane-urea resin is the polyurethane-urea resin obtained by reacting,~~
~~(A1) at least one polyol compound selected from the group consisting of polyether polyol, polycarbonate polyol, polycaprolactone polyol, and polyester polyol,~~
~~(A2) a polyisocyanate compound having two or more isocyanate groups in the molecule, and~~
~~(A3) an amino group containing compound having two or more groups capable of reacting with the isocyanate group, and among these groups, at least one of the groups are amino group.~~

~~3. The photochromic composition as set forth in claim 2, wherein an amount ratio of the components (A1), (A2) and (A3) used when obtaining the polyurethane-urea resin satisfies n1: n2: n3 = 0.3 to 0.9: 1: 0.1 to 0.7 when a total mol number of a hydroxyl group included in said component (A1) is n1, a total mol number of an isocyanate group included in said component (A2) is n2, and a total mol number of an amino group included in said component (A3) is n3.~~

~~4. The photochromic composition as set forth in claim 2, wherein (A1) the polyol compound has a molecular weight of 400 to 3000, and (A3) the amino group containing compound has a molecular weight of 50 to 300.~~

~~5. The photochromic composition as set forth in claim 2 wherein (A3) the amino~~

~~group-containing compound is at least one selected from the group consisting of diamine, triamine, aminoalcohol, aminocarboxylic acid, and aminothiol.~~

~~6. The photochromic composition as set forth in claim 1 wherein (A) the polyurethane-urea resin has a piperidine structure, a hindered phenol structure, a triazine structure, or a benzotriazol structure.~~

~~7. The photochromic composition as set forth in claim 1 wherein (A) the polyurethane-urea resin has the piperidine structure, the hindered phenol structure, the triazine structure, or the benzotriazol structure at a terminal end.~~

~~8. The photochromic composition as set forth in claim 1 wherein (A) the polyurethane-urea resin is the polyurethane-urea resin obtained by reacting,~~
~~(A1) at least one polyol compound selected from the group consisting of polyether polyol, polycarbonate polyol, polycaprolactone polyol, and polyester polyol,~~
~~(A2) a polyisocyanate compound having two or more isocyanate groups in the molecule, (A3) an amino group containing compound having two or more groups capable of reacting with the isocyanate group, and among these groups, at least one of the groups are amino group, and~~
~~(A4) a functionalization compound having one or two groups, in the molecule, capable of reacting with the isocyante group and having the piperidine structure, the hindered phenol structure, the triazine structure, or the benzotriazol structure in the molecule.~~

~~9. The photochromic composition as set forth in claim 8 wherein an amount ratio of components (A1), (A2), (A3), and (A4) used when obtaining (A) the polyurethane-urea resin satisfies n1: n2: n3: n4 = 0.3 to 0.89: 1.0: 0.1 to 0.69: 0.01 to~~

~~0.2 when a total mol number of a hydroxyl group included in said component (A1) is n1, a total mol number of an isocyanate group included in said component (A2) is n2, a total mol number of an amino group included in said component (A3) is n3, and a total mol number of groups capable of reacting with isocyanate group included in said component (A4) is n4.~~

~~101~~. A photochromic composition comprising (A) a polyurethane-urea resin having an urea bond in the molecular chain, (B) a photochromic compound, and (D) an isocyanate compound having at least one isocyanate group in the molecule.

~~112~~. The photochromic composition as set forth in claim ~~101~~ wherein (A) the polyurethane-urea resin is terminated at the terminal end by reacting the terminal end thereof with (A5) a terminator having a group ~~cpapable~~ capable of reacting with one isocyanate group in the molecule.

~~123~~. The photochromic composition as set forth in claim ~~101~~ wherein (A) the polyurethane-urea resin has a piperidine structure, a hindered phenol structure, a triazine structure, or a benzotriazol structure at the terminal end.

~~134~~. The photochromic composition as set forth in claim ~~101~~ wherein (A) the polyurethane-urea resin is the polyurethane-urea resin obtained by reacting,
(A1) at least one polyol compound selected from the group consisting of polyether polyol, polycarbonate polyol, polycaprolactone polyol, and polyester polyol,
(A2) a polyisocyanate compound having two or more isocyanate group, in the molecule, (A3) an amino group containing compound having two or more groups capable of reacting with the isocyanate group, and among these groups, at least one of the groups

are amino group, and

(A4) a functionalization compound having one or two groups, in the molecule, capable of reacting with the isocyante group and having the piperidine structure, the hindered phenol structure, the triazine structure, or the benzotriazol structure in the molecule.

~~14~~5. The photochromic composition as set forth in claim ~~13~~4 wherein an amount ratio of components (A1), (A2), (A3), and (A4) used when obtaining (A) the polyurethane-urea resin satisfies n1: n2: n3: n4 = 0.3 to 0.89: 1.0: 0.1 to 0.69:0.01 to 0.2 when a total mol number of a hydroxyl group included in said component (A1) is n1, a total mol number of an isocyanate group included in said component (A2) is n2, a total mol number of an amino group included in said component (A3) is n3, and a total mol number of groups capable of reacting with isocyanate group included in said component (A4) is n4.

~~15~~6. The photochromic composition as set forth in claim ~~10~~1 wherein (D) the isocyanate compound has a molecular weight of less than 1000.

~~16. The photochromic composition as set forth in claim 1 wherein the content of (B) the photochromic compound is 0.1 to 20 parts by weight with respect to 100 parts by weight of said (A) polyurethane-urea resin.~~

~~17~~7. The photochromic composition as set forth in claim ~~10~~1 wherein the content of (B) the photochromic compound is 0.1 to 20 parts by weight with respect to 100 parts by weight of said (A) polyurethane-urea resin.

~~18. The photochromic composition as set forth in claim 1 wherein 5 to 900 parts by~~

~~weight of (C) an organic solvent is further comprised with respect to 100 parts by weight of (A) the polyurethane-urea resin.~~

~~19~~8. The photochromic composition as set forth in claim ~~10~~1 wherein 5 to 900 parts by weight of (C) an organic solvent is further comprised with respect to 100 parts by weight of (A) the polyurethane-urea resin.

~~20. An optical article having a multilayer structure wherein two optical sheets or films facing each other are bound via an adhesive layer comprising the photochromic composition as set forth in claim 1.~~

~~21~~9. An optical article having a multilayer structure wherein two optical sheets or films facing each other are bound via an adhesive layer comprising the photochromic composition as set forth in claim ~~10~~1.

~~22. An optical article having a multilayer structure wherein two optical sheets or films facing each other are bound via a first adhesive layer comprising the photochromic composition as set forth in claim 1, and a second adhesive layer present at both sides of said first adhesive layer.~~

~~23~~10. An optical article having a multilayer structure wherein two optical sheets or films facing each other are bound via a first adhesive layer comprising the photochromic composition as set forth in claim ~~10~~1, and a second adhesive layer present at both sides of said first adhesive layer.

~~24. A production method of the optical article as set forth in claim 20, comprising a~~

~~step (I) of forming a photochromic adhesive sheet comprising (A) the polyurethane-urea resin and (B) the photochromic compound dispersed in (A) the polyurethane-urea resin, by extending the photochromic composition comprising (A) the polyurethane-urea resin having the urea bond in the molecular chain, (B) the photochromic compound and (C) the organic solvent of 5 to 900 parts by weight with respect to 100 parts by weight of (A) the polyurethane-urea resin on a flat and smooth base material, then removing (C) the organic solvent by drying and separating the base material; and a step (II) of forming said multilayer structure by binding two optical sheets or films by placing said photochromic adhesive sheet in between two optical sheets or films facing each other.~~

~~25~~11. A production method of the optical article as set forth in claim ~~21~~9, comprising a step (I) of forming a photochromic adhesive sheet comprising (A) the polyurethane-urea resin and (B) the photochromic compound dispersed in (A) the polyurethane-urea resin, by extending the photochromic composition comprising (A) the polyurethane-urea resin having the urea bond in the molecular chain, (B) the photochromic compound, (D) the isocyanate compound comprising at least one isocyanate group in the molecule and (C) the organic solvent of 5 to 900 parts by weight with respect to 100 parts by weight of (A) the polyurethane-urea resin on a flat and smooth base material, then removing (C) the organic solvent by drying and separating the base material; and a step (II) of forming said multilayer structure by binding two optical sheets or films by placing said photochromic adhesive sheet in between two optical sheets or films facing each other.