

CHAPTER 3

EXPERIMENTAL

3.1 Materials and Chemicals

3.1.1 Dye-based inkjet ink set for BJC 8500 from Canon Inc., Japan

- a. BCI-8C: cyan color, water soluble copper phthalocyanine dye
- b. BCI-8M: magenta color, mono-azo dye
- c. BCI-8Y: yellow color, dis-azo dye
- d. BCI-8PBK: black color, mixture of dis-azo dye and tris-azo dye
- e. BCI-8PC: light cyan color, water soluble copper phthalocyanine dye
- f. BCI-8PM: light magenta color, mono-azo dye

The chemical structures of these dyes are shown in Figure 3-1

3.1.2 UV absorber

- a. Cibafast W liquid (Figure 3-2a) from Ciba Specialty Chemicals

(Thailand), Bangkok, Thailand

Anionic sulfonated benzotriazole derivatives, specific gravity at

20 °C = 1.1, pH of 5 % solution = 6.5-7.5

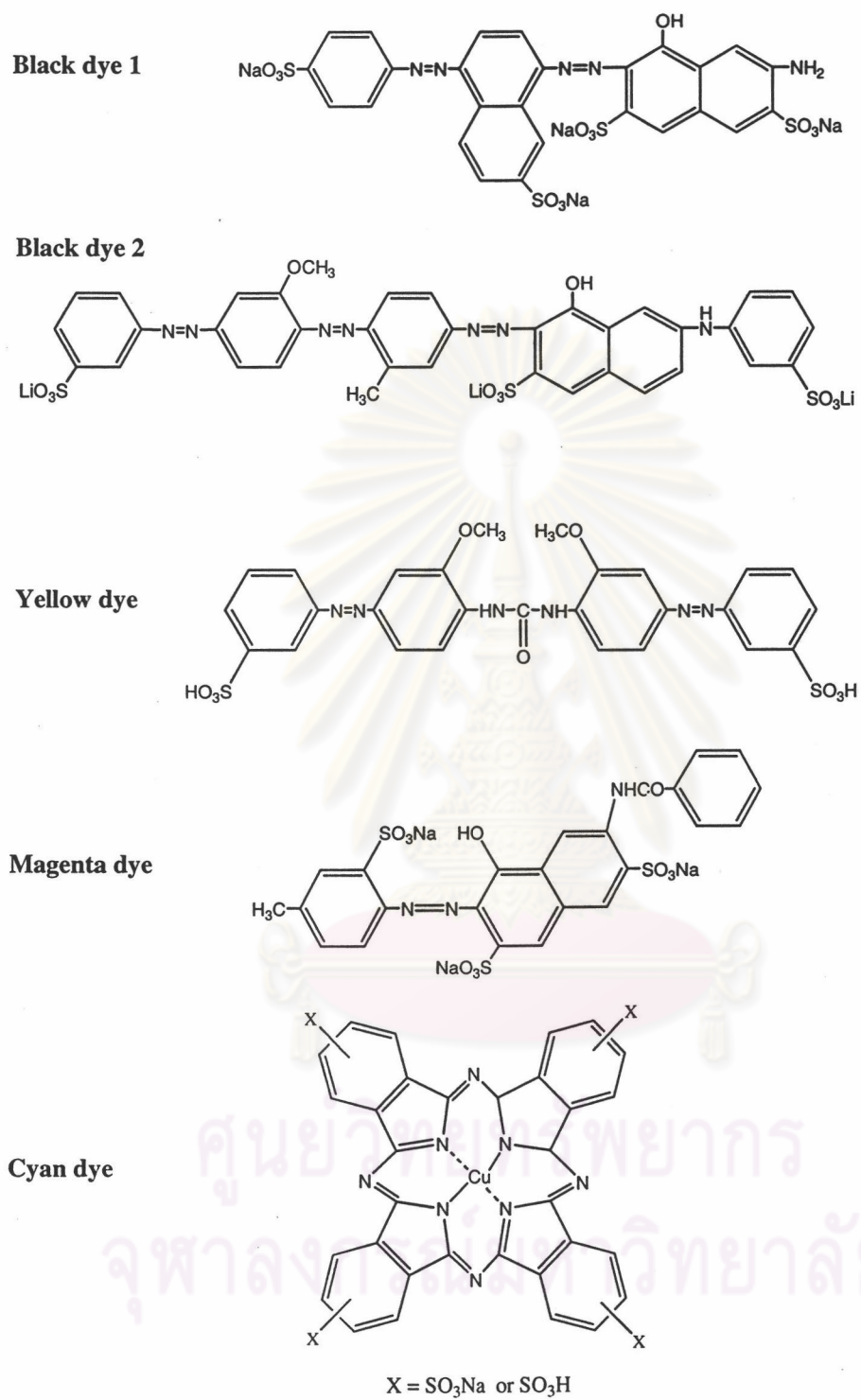


Figure 3-1 Chemical structures of dye used in inkjet ink⁶

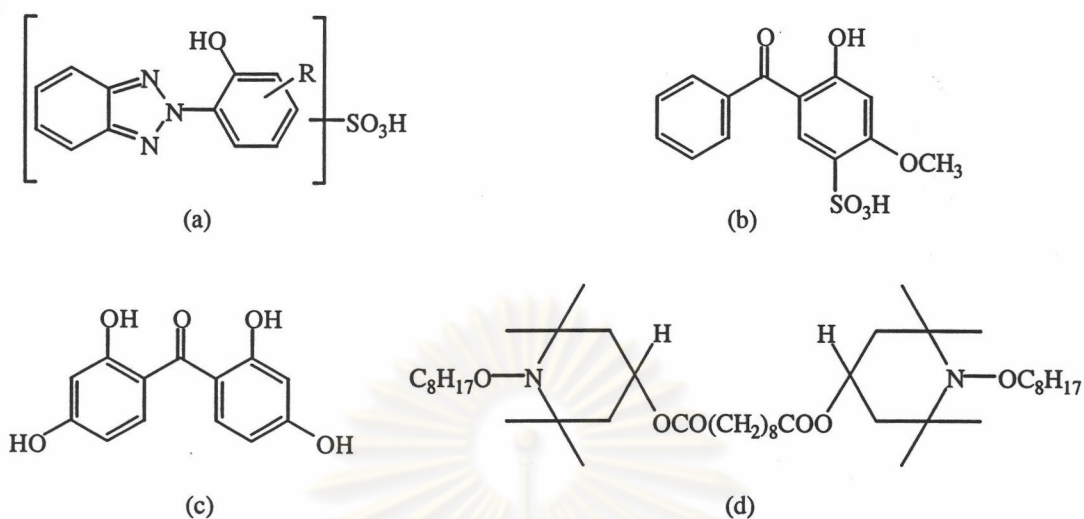


Figure 3-2 Chemical structures of UV absorbers and HALS (a) Cibafast W Liquid,²² (b) Uvinul MS40,²³ (c) Uvinul 3050,²⁴ (d) Tinuvin 123²⁵

b. Uvinul MS40 [2-Hydroxy-4-methoxybenzophenone-5-sulfonic acid (Figure 3-2b)] from BASF, Ludwigshafen, Germany

Hydroxybenzophenone derivatives, $\overline{M}_w = 308$, melting point = 180-195 °C, density at 25 °C = 0.90 g/cm³, Water solubility (at 30 °C) = 250 g/l

c. Uvinul 3050 [2,2',4,4'-Tetrahydroxybenzophenone (Figure 3-2c)] from BASF, Ludwigshafen, Germany

Hydroxybenzophenone derivatives, $\overline{M}_w = 246$, Melting point = 195-197 °C, density at 25 °C = 1.21 g/cm³, water solubility (at 30 °C) <1 wt.%

3.1.3 Hindered amines light stabilizer

Tinuvin 123 [Decanedioic acid, bis(2,2,6,6-tetramethyl-1-(octyloxy)-4-piperidinyl)ester (Figure 3-2d)] from Ciba Specialty Chemicals (Thailand), Bangkok, Thailand, having $M_w = 737$, density at $20^\circ\text{C} = 0.97 \text{ g/cm}^3$, dynamic viscosity at $20^\circ\text{C} = 3000 \text{ mPa s}$, water solubility $< 0.01 \text{ wt.}\%$.

3.1.4 Surfactant dispersion pigment from Fuji Color, Osaka, Japan as shown in Table 3-1. The type of surfactant is ionic-ionic surfactant as show below:

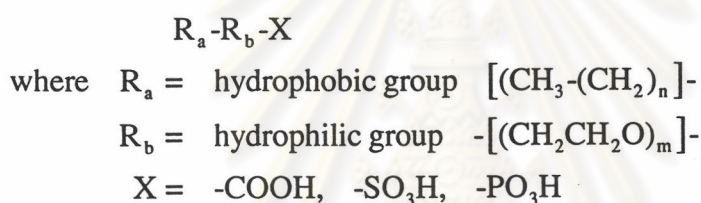


Table 3-1 Surfactant dispersion pigment

Color	Product name	Color index	Pigment concentration (wt %)
Black	SP Black 8796	C.I. Pigment Black 7	15
Cyan	SP Blue 6448	C.I. Pigment Blue 15:3	18
Magenta	SP Magenta 9345	C.I. Pigment Red 122	14
	SP sample 864	C.I. Pigment Red 184	14
Yellow	SP Yellow 4254	C.I. Pigment Yellow 138	12
	SP sample37	C.I. Pigment Yellow 17	12

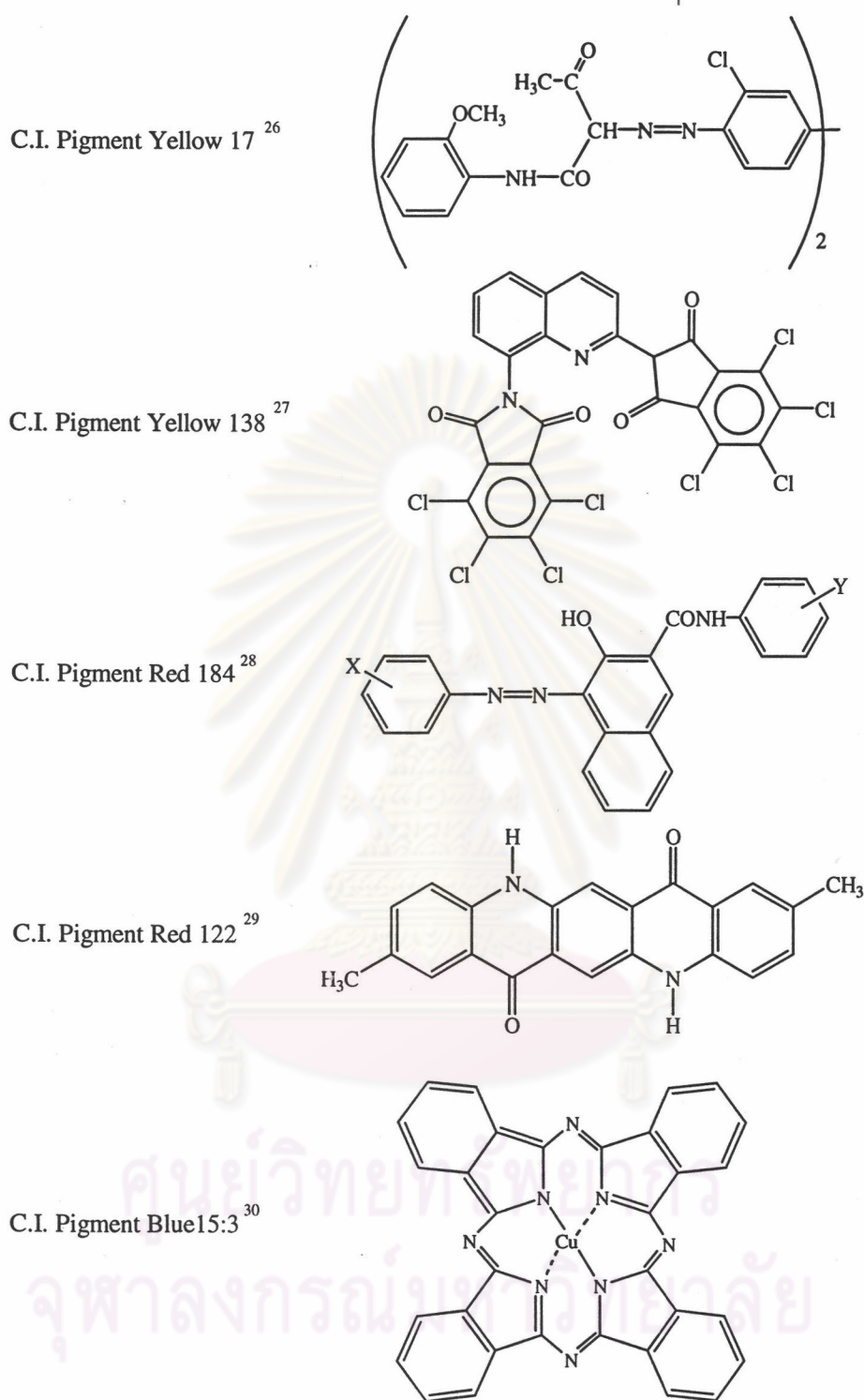


Figure 3-3 Chemical structure of pigment

3.1.5 Poly(ethylene imine)

Lupasol FG from BASF, Ludwigshafen, Germany

98 % solid, viscosity 2000-1000 mPa s, $\overline{M}_w = 800$

3.1.6 Poly(vinyl alcohol)

PVA 205 from Siam Chemicals & Resins, Thailand

degree of polymerization 1000, 98-99 % hydrolysis

3.1.7 Methanol, analytical grade from Merck, Darmstadt, Germany

3.1.8 Toluene, analytical grade from Merck, Darmstadt, Germany

3.1.9 Ethylene glycol, analytical grade from Merck, Darmstadt, Germany

3.1.10 Poly(ethylene oxide) cetyl ether

BC 30-TX Surfactant $[\text{CH}_3(\text{CH}_2)_{15}-(\text{OCH}_2\text{CH}_2)_{30}-\text{OH}]$ from Nikkol

Chemical, Tokyo, Japan.

3.1.11 Wire bar coater nos.6, 12, 24 and 50

3.1.10 High glossy photo film

Canon HG-201 from Canon, Japan

3.2 Apparatus

3.2.1 Viscometer: Brookfield DV III Programmable Rheometer, model TC500, Brookfield Engineering Laboratories Inc., Stoughton, USA

3.2.2 Surface tensiometer : K8, Kruss, Germany

3.2.3 Weather-o-meter:

3.2.3.1 Xenon arc lamp weather-o meter: X75, Suga Test Instrument Co., Ltd., Tokyo, Japan

3.2.3.2 Ozone testing chamber: Suga Test Instrument Co., Ltd., Yokyo, Japan

3.2.4 Spectrophotometer with Measurement geometry $45^{\circ}/0^{\circ}$, Illuminant D65, CIE 1931 2° observer:

3.2.4.1 Spectrolino, Gretag-Macbeth AG, Rogensdorf, Switzerland

3.2.4.2 Digital Swatchbook, X-Rite Inc., Grandville, USA

3.2.5 Inkjet printer:

3.2.5.1 Canon BJC 8500, Canon Marketing (Thailand) Ltd., Bangkok, Thailand

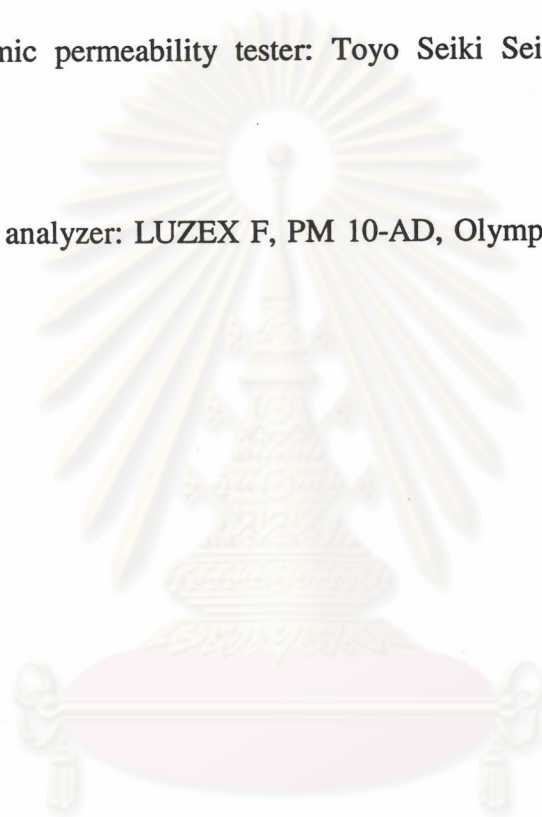
3.2.5.2 Canon BJC 850, Canon Inc., Tokyo, Japan

3.2.6 Electronic balance: AEX-120G Analytical balance, Shimadzu Corporation, Japan

3.2.7 Mechanical Homoginizer: T.K. ROBO MICS, Tokushu Kika Kogyo Co., Ltd., Osaka, Japan

3.2.8 Dynamic permeability tester: Toyo Seiki Seisaku-sho, Ltd., Tokyo, Japan

3.2.9 Image analyzer: LUZEX F, PM 10-AD, Olympus, Nierco Corporation, Tokyo, Japan



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