

Project Title

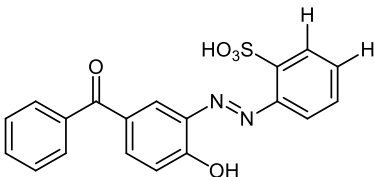
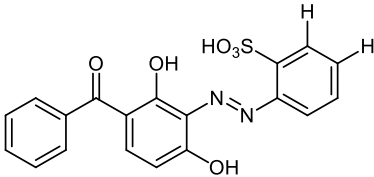
“Synthesis & Application of Solar Ultraviolet Radiation Protective Functional Dyes for Textile Materials”

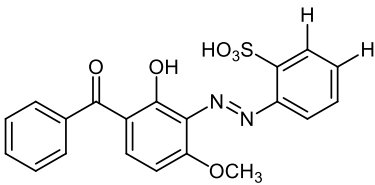
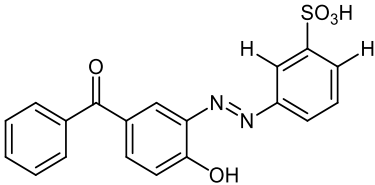
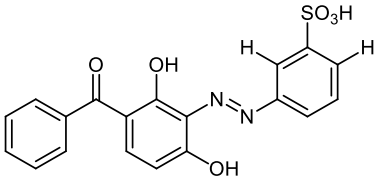
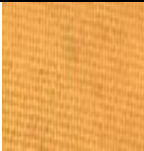
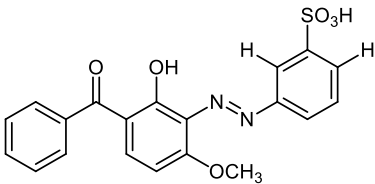
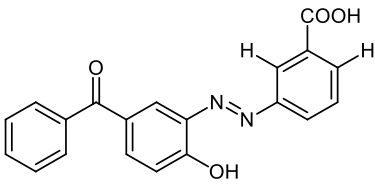
Point 1. Novelty in the project.

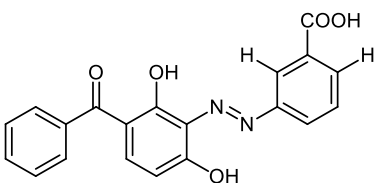
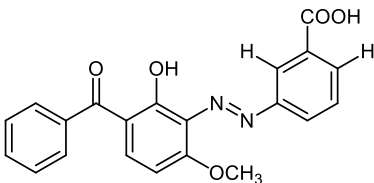
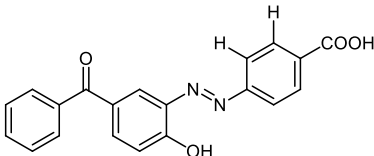
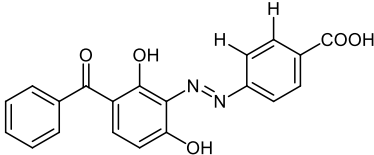
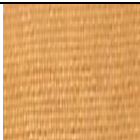
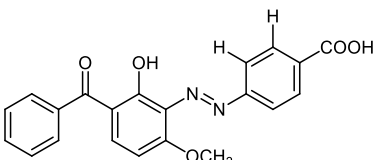
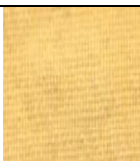
Conventional dyeing of fabric and finishing with UV protective finish is two stage process whereas WRA's developed azo acid and disperse dyes with built-in UV-absorber helps to dye and finish wool, silk, nylon and polyester fabric in single stage. This development will help to reduce water, chemical and energy consumption during wet processing which ultimately reduces the production cost.

Point 2. Cross sectional view of development:

Developed acid dyes

Dye No.	Dye	Molecular Formula/ Compound Structure New	Elemental analysis (%)		Colour
			Calculated	Found	
1	Orthanilic acid /4-OH Benzophenone	 <chem>O=S(=O)c1ccc(cc1)/N=N/c2ccc(cc2)C(=O)c3ccccc3</chem>	C, 59.68; H, 3.69; N, 7.33; O, 20.92; S, 8.39	C 59.69; H, 3.68; N, 1.34	
2	Orthanilic acid/2,4-diOH Benzophenone	 <chem>O=S(=O)c1ccc(cc1)/N=N/c2cc(O)cc(O)c2C(=O)c3ccccc3</chem>	C, 57.28; H, 3.54 ;N, 7.03; O, 24.10; S, 8.05	C, 57.31; H, 3.55; N, 7.03	

3	Orthanilic acid /2-OH,4-OCH ₃ Benzophenone	C ₂₀ H ₁₆ N ₂ O ₆ S 	C, 58.25; H, 3.91; N, 6.79; O, 23.28; S, 7.77	C, 58.28; H, 3.90; N, 6.78	
4	Metanilic acid /4-OH Benzophenone	C ₁₉ H ₁₄ N ₂ O ₅ S 	C, 59.68; H, 3.69; N, 7.33; O, 20.92; S, 8.39	C, 59.71; H, 3.68; N, 7.34	
5	Metanilic acid /2,4-diOH Benzophenone	C ₁₉ H ₁₄ N ₂ O ₆ S 	C, 57.28; H, 3.54; N, 7.03; O, 24.10; S, 8.05	C, 57.26; H, 3.55; N, 7.04	
6	Metanilic acid /2-OH,4-OCH ₃ Benzophenone	C ₂₀ H ₁₆ N ₂ O ₆ S 	C, 58.25; H, 3.91; N, 6.79; O, 23.28; S, 7.77	C, 58.27; H, 3.92; N, 6.78	
7	3 amino benzoic acid /4-OH Benzophenone	C ₂₀ H ₁₄ N ₂ O ₄ 	C, 69.36; H, 4.07; N, 8.09; O, 18.48	C, 69.37; H, 4.08; N, 8.08	

8	3 amino benzoic acid/2,4-diOH Benzophenone	$C_{20}H_{14}N_2O_5$ 	C, 66.30; H, 3.89; N, 7.73; O, 22.08	C, 66.32; H, 3.88; N, 7.74	
9	3 amino benzoic acid /2-OH,4-OCH ₃ Benzophenone	$C_{21}H_{16}N_2O_5$ 	C, 67.02; H, 4.28; N, 7.44; O, 21.26	C, 67.05; H, 4.28; N, 7.45	
10	4 amino benzoic acid / 4-OH Benzophenone	$C_{20}H_{14}N_2O_4$ 	C, 69.36; H, 4.07; N, 8.09; O, 18.48	C, 69.40; H, 4.08; N, 8.08	
11	4 amino benzoic acid /2,4-diOH Benzophenone	$C_{20}H_{14}N_2O_5$ 	C, 66.30; H, 3.89; N, 7.73; O, 22.08	C, 66.31; H, 3.88; N, 7.74	
12	4 amino benzoic acid /2-OH,4-OCH ₃ Benzophenone	$C_{21}H_{16}N_2O_5$ 	C, 67.02; H, 4.28; N, 7.44; O, 21.26	C, 67.05; H, 4.29; N, 7.43	

Point 3. Publication & Patent in the project.

a. Paper published: 02

1. Synthesis and application of UV ray's protective mono azo acid dyes on wool, silk and nylon" submitted to Journal of the textile Institute
2. Comparative study of UPF, light fastness and dyeing properties of benzophenone based disperse dyes for UV protective clothing" submitted to Fibers and Polymers

b. Patent

Title of patent: UV rays protective dyes

Application no: 201821027145

Point 4. Commercialization partner Industries

Following Industries have shown interest in commercialization:

- Spectrum Dyes & Chemicals Pvt. Ltd.)- Turn Over INR 465 Crore

Point 5. Commercialization Status

Developed dyes are scaled up at pilot scale

The industry is in process of preparing shade card for field trail to judge acceptability of dyed fabric in the market.