ANTHRANON VAT DYES

INTRODUCTION:
Anthranon range of vat dyes are derived from anthraquinone and possess all round fastness propertires, when applied to cellulosic substrate, either fibre, yarn on fabric.
These dyes are marketed in water insoluble form. It is neccessary to convert tem into their soluble “LEUCO” form by reducing them with Caustic Soda and Sodium Hydrosulphite, while applying to cellulosic substrate during dyeing process. At the fineal stage of dyeing, this soluble form is converted again to insuluble form by Oxidation process followed by soaping treatment. Correct shade of Vat Dyes with desired fastness properties is developed only after soaping.

PHYSICAL FORMS & THEIR APPLICATION:
ANTHRANON DYES will be made availabled in powder (powder fine), ultra conc and fine dispersion S/D varieties.
Powder fine and ultra conc varieties are suitable for batch wise LEUCO dyeing methods and are not suitable for pigmentation methods involving any padding application. Finely dispersed S/D variety can be used for both padding aswell as exhaust dyeing applications.
Main features of Supra Disperse S/D vairety.

1. Extremely uniform and fine practicle size.
2. Ease of vatting.
3. Excellent Dispersion stability in water.
4. No need of dye assistants during dyeing or preparing, normally.

Details of vatting methods as well as IN, IW, IK & IN special i.e iN + dyeing methods are given hereunder in Tables 1 to 5. For vatting, powder varieties dyes should be pasted with Turkey Red oil before addition of water. Quantities of Caustic Soda and Sodium Hydrosulphite given in Table 2 to 5 are total quantities and those used for vatting in Table 1 Should be deducted from it.

Exhaust Dyeing method

Stock Vat Method

Table 1

Stock Vat		**A**	**B**	**C**
Dyestuff	Kg.	1	1	1
Soft Water	Lit.	50	50	100
Caustic Soda Solid	Kg.	1	1.5	2.5
Sodium Hydrosulphite	Kg.	0.75	1	2
Vatting Temperature	℃	50	60	60
Vatting Time	Min	10-15		

IN Method

Table 2

Chemicals		Depth of Shade	Material to liquor ratio			
			1:4	1:10	1:20	1:30
Casutic soda solid	g/l	Pale	10-12	6-8	4.5-5	4-4.45
		Medium	12-16	8-10	5-6	4.5-5.5
		Deep	16-20	10-12	6-7	5.5-6.5
Sodium hydrosulphite	g/l	Pale	6-9	3-5	2-2.5	1.8-2
		Medium	9-12	5-7	2.5-3.5	2-3
		Deep	12-17	7-9	3.5-5	3-4.5
Dyeing Temperature	℃	50-60				

IW Method

Table 3

Chemicals		Depth of Shade	Material to liquor ratio			
			1:4	1:10	1:20	1:30
Casutic soda solid	g/l	Pale	6-7	3.5-4.5	2.2-2.5	1.8-2.2
		Medium	7-10	4.5-5.5	2.5-3.5	2.2-3
		Deep	10-12	5.5-7	3.5-4.5	3-4
Sodium hydrosulphite	g/l	Pale	6-8	2.5-4	1.8-2	1.8-2
		Medium	8-11	4-6	2-3	2-2.5
		Deep	11-13	6-7	3-4.5	2.5-4
Glauber’s Salt calcined	g/l	Pale	5-10	5-10	5-10	5-10
		Medium	10-15	10-15	10-15	10-15
		Deep	15-20	15-20	15-20	15-20
Dyeing Temperature	℃	45-50				

IK Method

Table 4

Chemicals		Depth of Shade	Material to liquor ratio			
			1:4	1:10	1:20	1:30
Casutic soda solid	g/l	Pale	4.5-5	3-3.5	1.8-2	1.5-1.8
		Medium	5.5-7	3.5-4.5	2-2.8	1.8-2.5
		Deep	7-9	4.5-5	2.8-3.5	2.5-3
Sodium hydrosulphite	g/l	Pale	5-7	2.5-3.5	1.8-2	1.8-2.5
		Medium	7-10	3.5-5.5	2-3	2-2.5
		Deep	10-12	5.5-6.5	3-4	2.5-3.5
Glauber’s Salt calcined	g/l	Pale	10-15	10-15	10-15	10-15
		Medium	15-20	15-20	15-20	15-20
		Deep	20-30	20-30	20-30	20-30
Dyeing Temperature	℃	20-25				

IN + Method

Table 5

Chemicals		Depth of Shade	Material to liquor ratio			
			1:4	1:10	1:20	1:30
Casutic soda solid	g/l	Pale	16-20	10-12	8-10	6-8
		Medium	20-25	12-15	10-13	8-11
		Deep	25-30	15-18	13-15	11-13
Sodium hydrosulphite	g/l	Pale	7-10	6-8	5-6	5-6
		Medium	10-15	8-10	6-7.5	6-7
		Deep	15-18	10-12	7.5-9	7-9
Dyeing Temperature	℃	75-80				

DYEING OF SUBSTRATE:

A. Cotton Yarn:

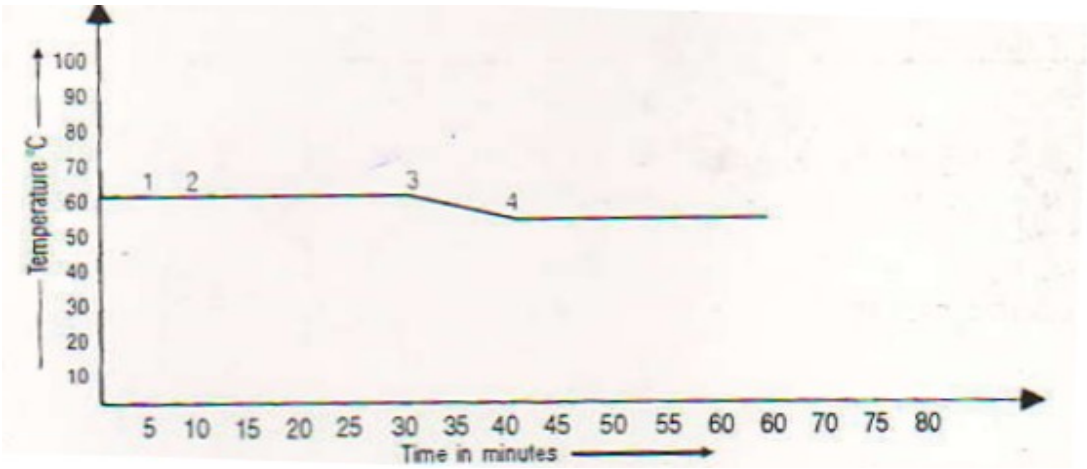
Cotton Yarn is dyed either in hank from in open vats in M:L:1:20 or in from of packages. Both powder qualities as well as Finely Disperse qualities of anthranon Vat Dyes can be used. Vatting is not necessary for Finely Disperse S/D qualities applied by pigmentation technique.

Well scoured yarn is entered and worked for 45-60 minutes at the recommended dyeing temperature using Caustic soda and Hydrosulphite as recommended in table 2to5.

In case of open vats agitation should be brisk at first and then more slowly as dyeing proceeds. Similarly in case of package dyeing machines, the chage of direction of flow of dye liquor in either direction has to be at frequent intervals during the first 10-15 minutes and thereafter at less intervals.

Addition of Glauber's Salt Calcined required for medium and dark shades is recommended in 3-4 portions at intervals of 5 minutes after the commencement of dyeing.

Dyeing by pigmentation methode, is illustrated in a graph below:



1. Addition of dye solution at RT raising temperature to 60℃ and circulating at 60℃ for 20 minutes
2. Addition of Glauber's salt calcined or common salt in 3-4 lots at intervals of 5 minutes
3. Addition of Caustic Soda.
4. Addition of Sodium Hydrosulphite.

B. Piece Goods:

1. Batch Wise Methods:

Fabric can be dyed by exhaust dyeing method on jiggers or Beam dyeing machines or any suitable machine using vatting and dyeing methods given in Tables 1 to 5 depending on the colours used.

For Pad-Jig method, only Finely dispersed Anthranon S/D dyes are to be used Avoid water splashes and frictional handling prior to transfer of padded cloth on Jigger for reduction.

2. Continuous Methods:

The following methods are widely used:
a. Pigmentpad-Jigger development.
b. Pigment pad-Dry (Optional) Chemical pad-Steam Rinse Oxidise Soap.
Well scourd dry cloth is padded through a dispersion of Anthranon S/D dyestuff quality in water containing 2 g/l good wetting agent preferably, on a 3-Bowl padding mangle to get 60-70% pick up. Intermediate drying not necessary. However whenever drying is done, cloth has to be air cooled before reduction process. Intermediate drying helps in getting fuler and level dyeings. Addition of good quality migration inhibitor to the padding liquor is advantageous.

Pad-Jig development process:

In case of developing on jigger, it is advisable to add 10-20 ccs/lt. Of padding liquor in the jigger bath to compensate for any loss of colour due to bleeding of the dyestuffs. Development is to be carried out for about 45 minutes befor draining the dye bath and subsequently oxidation and soaping is carrid out.

Pad-Steam-dyeing process:

A Pad-Steam range normally consists of a padding mangle, hot flue dryer. Padding mangle and a steamer followed by open width soaper and a dryer. Steaming is a carried out for about 30-45 seconds in air free atmosphere at 102-105℃.

Composition of padding liquor is given below:

Concentrating of dyestuff in padding	Caustic Soda (g/l)	Sodium Hydrosulphite (g/l)	Glauber's salt calcined or Common salt (g/l)
Upto 10	12-18	12-18	15
10-20	19-25	19-25	15
20-30	26-31	26-31	20
30-40	32-37	32-37	25
40-50	38-45	38-45	30
50-60	46-50	46-50	30

Liquor pick-up : 100% bath temperature : 20-25℃

Oxidation & soaping treatment:

After completion of dyeing, chemical oxidation is carried out using either sodium perborate or hydrogen peroxide. Soidum bichromate is not recommended for present ecofriendly requirements.

Oxidation Method

		Batch wise Oxidation method	Continuous method	Temp ℃	Time in Min.
Sodium Perborate	g/l	2-5	3-5	50-60	20-30
Hydrogen Peroxide 130 vols.	ml/l	2-3	4-6	50-60	20-30

After oxidation, dyed substrate is rinsed and subsequently soaped at near in a bath containing 2to3 g/l of Lissapol good quality non-ionic detergent and 2 g/l Soda Ash. In batch wise process, soaping is to be carried out for 15 to 20 minutes, In continuous soaping range, soaping is required to be done in two to three compartments, depending on the design of compartment. However, for development of proper shade and highest fastness properties thorough soaping is absolutely necessary. Dyeings are finally rinsed in hot as well as cold water.

Special Instructions:

1. In case of dyeing with Black BB, initially a dard green shade is obtained Proper Black shade is attained only after treatment in a cold bath containing 1-2g Sodium Nitrite and 2-3 ccs Sulphuric Acid (conc) per liter or 2gms/lit available chlorine at pH 10.5 for 30 minutes.

2. Blue R and Blue 3R dyes are vatted in full volume in the dye bath containing the total quantities of caustic soda and hydrosulphite given in tables 2,3,4&5.

3. For Blue R, Blue 3R & Blue BC, immediate rinsing in water after dyeing and prior to Oxidation is absolutely necessary to get correct shade.