



FORMALDEHYDE FREE WATER SOLUBLE TONERS

Technical Information

Applications:

Water based flexo inks

Water based gravure inks

Product description

RADGLO® STX toners represent a unique fluorescent ink system which, although delivered in dry form, is totally water-soluble. With the addition of a small amount of ammonia and alcohol, but without other binder additives, a complete water ink system for flexographic and/or gravure ink can be formulated. Waterborne inks of vivid fluorescent colours are obtained, which are in spite of the high solid content still right low in viscosity. Water-based inks made from STX exhibit excellent film forming properties, colour strength and high gloss. STX exhibits excellent transparency making it the system of choice for printing on foil and film.

Because of these unique properties STX gives the ink maker an unexcelled flexibility, quality and value when formulating fluorescent waterborne inks.

Chemical composition

RADGLO® STX toners are solid solutions of fluorescent dyes in polyester resins.



Available colours

STX-09: UV Blue

STX-10: Chartreuse

STX-13: Orange

STX-15: Red

STX-17: Pink

STX-18: Magenta

Physical properties

- Product form: coarse powder
- Average particle size: 70–90 µm
- Spec. gravity: 1.2 g/ml
- Bulking value: 0.6 g/ml
- Viscosity of 30% in the recommended formulation (see below): 30 - 90 cP (Brookfield VT: 25°C)

Regulatory and Ecotox information

RADGLO® fluorescent pigments as such are not classified in the Colour Index, but certain colour components are. All components are registered in the main international and national inventories like a.o. EINECS (Europe) and TSCA (USA).

RADGLO® STX series is in conformity with the purity requirements of EN71 part 3. RADGLO® STX series is basically free from heavy metals. For detailed information, please consult the individual MSDS.

Lightfastness

Lightfastness

The lightfastness of STX toners is superior to most solvent-based fluorescent flexographic and gravure inks. In general fluorescent pigments are more fugitive than conventional pigments. They are stable to indoor light or outdoor conditions other than direct sunlight.

By exposure to outdoor sunlight the colour will change, whereby the degree of fading is depending on following factors:

- colour of the toner
- toner loading and film thickness of the end print
- The higher the toner loading and thickness, the better the lightfastness.
- intensity and angle of the incident sunlight

The lightfastness may be improved by including UV-absorber(s) in the formulation and/or by making use of clear overcoats containing UV-absorber(s).

STX series is formaldehyde free & water soluble.

Improved storage stability results in better solubility upon aging due to low cold flow.

Applications & Storage

Applications

RADGLO® fluorescent STX toners are general grade toners, which can be used in waterborne systems.

Typical applications are:

Water based flexographic & Water based gravure inks.

Storage

RADGLO® fluorescent STX toners have a moderate glass transition temperature and shouldn't be stored at elevated temperatures. Anyway they have especially been developed for improved storage stability.

RADGLO® STX toners remain stable and unchanged (12 month) provided they are kept in a dry storage place in a sealed container away from heat (<30 °C) and humidity.

Due to the excellent solubility of STX toners, both waterborne and solvent based formulations might be created.

Solubility

See formulation guidelines for solubility. Waterborne solutions up to 40% can be made from RADGLO® fluorescent STX toners.

Solvent based formulations (acetone, MEK) are also accessible utilizing STX.

Formulation guidelines

1. Fast drying & high colour strength inks

De-mineralized water	100 g	Premix the liquids at low speed. An equivalent amount of triethanolamine, aminomethylpropanol or some other less volatile amine may (partially) substitute ammonia.
Isopropanol	64 g	
Ammonium hydroxide (28%)	16 g	
RADGLO® STX toner (dry)	120 g	Increase the mix speed till 3500 - 5000 rpm and add the STX toner slowly over a period of approximately 10 minutes. Rapid addition leads to lump formation. After the addition of the STX toner mix for 40 minutes.
De-mineralized water	80 g	Keep mixing and add 80 g de-mineralized water.
	x g	If the solution remains cloudy, keep mixing and add up to 1g ammonium hydroxide step by step. Check pH and adjust to 6.8 - 7.2. If pH is too low, keep mixing and add ammonium hydroxide step by step*. Be sure the pH does not exceed 7.5! If inks are not finished to a proper pH range, colour shift may result.
De-mineralized water	20 - x g	Keep mixing and finish the STX ink by adding the balance of water bringing the total amount of ink to 400 g. Skip this step for higher colour strength.
Total	400g	

Strictly following these instructions results in fast drying and high colour strength inks. They have been tested to minimize the colour shift and/or viscosity changes that are typically encountered in water based ink systems.

Make use of a covered container and a high-speed disperser with a Cowles blade.

* If pH is overshoot (try to avoid that), adjust with a weak solution of acid like 5% phosphoric acid in water. Deduct this amount from the final water too.

2. UV curable inks

Water	17.8 + 0.4 (*)	parts
Isopropanol	11.4	
Ammonium hydroxide (28%)	4.3 + 1.7 (*)	
RADGLO® STX toner (dry)	22.0	

(*) To be added during or after dissolving STX if needed.

Process as mentioned above than add while mixing the following stepwise and slowly.

SR344 (Sartomer)	14.0	parts
Isopropanol	11.3	
DAROCUR 1173 (**) (CIBA / BASF)	5.7	
Ebecryl 3608 (Cytec)	11.4	
Total	100.0	

(**) We recommend to test also Irgacure 819DW from CIBA/BASF instead.

3. Inks with improved shelf life & high water fastness

It is advisable to strictly follow the given instructions for preparing a 400 gram sample. This formulation is especially developed in order to produce inks with longer shelf life, less alcohol content and easier to scale up into production using dedicated dissolvers. Such inks reveal negligible colour shift and/or viscosity changes that are typically encountered in waterborne ink systems.

Make use of a covered container and a high-speed dissolver with a Cowles blade, mix until a clear solution is obtained. This will require approximately 1 hour of mixing depending on the dissolver equipment used.

De-mineralized water	200 g	Mix the liquids at 1000 rpm during 10 minutes until the additives are well dissolved into water.
Tego Dispers 740W (Evonik Tego Chemie GmbH)	3 g	
Tego Foamex 1488 (Evonik Tego Chemie GmbH)	1 g	
Ammonium hydroxide (28%) (17 g from a fresh quality is usually enough, older qualities tend to lose some NH ₃ , where 18 g are than needed.)	18 g (*)	Add ammonium hydroxide and mix 5 minutes more. Triethanolamine, aminomethylpropanol or some other less volatile amines may substitute ammonia (partially).
RADGLO® STX toner (dry)	120 g	Increase the mixing speed till 3500 - 5000 rpm and add the STX toner slowly. After the addition of the STX toner mix for 40 minutes.
Isopropanol	20 g	Keep mixing and add 20g isopropanol. Mix during 10 minutes after addition.
Ammonium hydroxide (28%)	x g	Check pH: the pH should be around 7 (in the range 6.8 - 7.2) If pH is too low, keep mixing and add x g ammonium hydroxide step by step (*). Be sure the pH does not exceed 7.2! If inks are not finished to a proper pH range, colour shift may result.
Water	38 - x g	Keep mixing and finish the STX-ink by adding the balance of water bringing the total amount of ink to 400 g.
Total	400g	

STX inks are stable for longer than 3 months, provided they are prepared within the pH range of 6.8 - 7.2 and without excess of ammonium hydroxide (ammonia). Checking and adjusting the pH to 7 on a regular base, prolongs the shelf life stability.

Lowering the viscosity of the final ink can be achieved by increasing the pH. This may result however in a limited shelf life, as the colour tends to shift within a few days already at a pH of 8 and even quicker at higher pH.

Using tap water instead of de-mineralized water, might influence the solubility for a given viscosity. A higher hardness of the tap water results in a lower solubility of STX.

STX based inks do not look fluorescent as such but result in excellent fluorescent films after drying on a white background. Adding white pigments in order to obtain fluorescence is not recommended as this would result in pastel colours.

Following the given procedure results in excellent waterfastness. Dry ink films withstand running tap water longer than 1 minute without any noticeable impact.

Keeping the pH of the final ink below 7 results in longer storage stability of STX-based inks.

* If pH is overshoot (try to avoid that), adjust with a weak solution of acid like 5% phosphoric acid in water. Deduct this amount from the final water too.

Available standard colours & package of the STX series:

COLOUR	STX-	Similar codes in the different series offer a comparable colour but are not 100% identical. Colour may depend on the specific formulations of the customer.		
UV Blue	STX-09	Package:	Bags containing:	Minimal order
Chartreuse	STX-10			
Orange	STX-13	1 box	1 x 20 kg	
Red	STX-15			
Pink	STX-17			
Magenta	STX-18			

® = registered trademark

Disclaimer: This technical information is just an advice. No warranty of fitness for a particular purpose is made.



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