

9.9 Consumer use of unprocessed photo paper containing silver in the emulsion layer

Appendix 2: Exposure Scenario Format (2) addressing uses carried out by consumers		
1. Title		
Free short title	Consumer use of unprocessed photo paper containing silver in the emulsion layer	
Systematic title based on use descriptor	SU21, AC8,	
Processes, tasks activities covered	Tasks and activities covered are described in section 2 below.	
Assessment Method*	<p>Human health</p> <p>A qualitative assessment was performed based partly on the parameter used in the RAC opinion document on the use of boric acid and borates in photographic applications by consumers.</p> <p>Environment:</p> <p>A quantitative statement on the potential emissions from consumer uses was developed.</p>	
2. Operational conditions and risk management measures		
Unexposed and therefore undeveloped silver halides will dissolve from the film emulsion layer into the fixer solution. So used fixer solutions are containing important amounts of dissolved silver.		
Task	Description	
Tank processing	The films are put in a light-tight container. This allows the operator to develop photographic films in day light environment. The photographic solutions as developers, stop bath and fixers are added and removed one after another. During film development the filled tank is continuously shaken/ moved thoroughly in order to distribute the developer/fixer evenly. During the shaking process the tank is closed. Exposure of the user is therefore not expected. Potential exposure to silver ions in the fixing solution is only possible during disposal of the fluid.	
Tray processing of films	Tray development has to be done in complete darkness. The films are introduced manually which may results in the immersion of parts of the hands at each stage of the process (development, stop bath, fixation). In this case the scenario involves possible hand contact with the fixing solution when introducing the sheet and when taking it out. Pressing down the sheet with one hand after introduction may also be possible. The shuffling method as applied in the borates case has not been regarded as relevant. If any the dermal route is the most relevant route of exposure, although the processing requires clean approaches to ensure no stains or spots occurring on the photographic end product.	
ERC	N/A	
2.1 Control of consumers exposure		
Product characteristic		
Description of the preparation	Concentration of the substance in the preparation	Physical state of the preparation
Emulsion layer	Black and white film: 5-6 g/m ² Black and white paper: 1.5-1.8 g/m ² Colour negative film: ca 8g/m ² Colour reverse film: 4-5 g/m ² Colour negative paper: 0.8-0.9 g/m ² Colour reverse paper: 1.1-1.3 g/m ² (Fotochemikalien: Daten und Fakten zum Umweltschutz 2.Auflage" W. Baumann, ISBN 3-540-57243-0)	Solid

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Fixing solution (used)	Tentative 4.44g Ag ion/L fixing solution The following assumptions were made: a film containing 4 g of Ag per m ² -a processing where 1/3 of the silverhalide is developed into the silver picture = 2/3 of the silverhalide is dissolved in the fixer solution -a replenishment rate of 600 ml/m ²	Liquid	
Amounts used			
Not relevant			
Frequency and duration of use/exposure			
Description of the task	Duration of exposure per event	frequency of events/ day	
Tank processing	< 15 min	Typical: 2 cycles WC: 4 cycles	
Tray processing of films	~ 10 min development time per cycle	Typical: 2 cycles WC: 4 cycles	
Human factors not influenced by risk management			
Description of the task	Population exposed	Exposed body part	Corresponding surface area SA [cm ²]
Tank processing	Adult (60 kg)	Both hands	840
Tray processing of films		Typical: fingertips (deviation from the RAC document) WC: both hands	Typical: 35.7 (deviation from the RAC document) WC : 840
Other given operational conditions affecting consumers exposure			
Not relevant			
Conditions and measures related to information and behavioural advice to consumers			
Do not get on skin and clothes. Wash thoroughly after handling.			
Conditions and measures related to personal protection and hygiene			
Wear suitable gloves and protective clothes.			
2.2 Control of environmental exposure			
Product (article) characteristic			
Solid, not biodegradable			
<p>Local and regional environmental exposure assessments have been conducted for both the manufacture and industrial use of silver substances, and the risks to different environmental compartments characterised. A safe level of emission has been presented in these generic exposure scenarios.</p> <p>Monitored data was used to determine the regional background concentration of silver in both freshwater and soil. This regional background concentration is considered to incorporate all sources of silver and silver salts in the environment, and incorporates all emissions from industrial and consumer uses.</p> <p>Based on the information provided of the end products of the industrial processes, silver has been shown to be bound within the product itself.</p> <p>There is a very limited potential for emissions of silver nitrate to the environment from the limited consumer uses of silver nitrate, due to the fact that the silver nitrate is consumed into the article. The only exception to this is the use of silver nitrate in photographic processing, for which a separate exposure scenario is applied, although this use of silver has been in decline for several years due to the fast replacement by digital photography, and recycling of silver (salts) containing photographic processing fluids is now relatively common and in some EU countries even obligatory.</p> <p>The remaining environmental emissions of silver nitrate from the remaining consumer uses are therefore considered to be negligible, and will be encompassed by far by the industrial emissions.</p>			

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3. Exposure estimation and reference to its source	
<p>The risk characterisation ratio (RCR) is the quotient of the refined exposure estimate and the respective DNEL (derived no-effect level). As no dermal DNEL for aqueous solutions of soluble silver ions is available no quantitative assessment has been provided.</p> <p>However, dermal contact to soluble silver ions leads to a black staining of the upper epidermis, which will outgrow and abrade if no constant renewal of silver on the skin persists. Thus a qualitative assessment has been performed for dermal exposure.</p>	
Human exposure	
Route of exposure	Comment
Oral	Oral exposure does not occur as part of the intended product use by consumers.
Inhalation	Inhalation exposure is disregarded as no mists or aerosols are generated during these tasks and gaseous releases are not expected.
Route of exposure	Method used, comments
Tank processing	
Dermal	<p>Qualitative assessment</p> <p>Potential dermal exposure to silver ions from the fixing solution is only possible during disposal. If appropriate gloves are worn no exposure to the skin needs to be expected. However, splashes on the skin cannot be excluded if no protective gloves are worn during disposal. Due to the black staining of silver ions on the upper epidermis it can be assumed that consumers would wear gloves to avoid this.</p> <p>Furthermore, there is also the aspect of maximising the quality of the photographic images being produced and therefore users will normally not allow chemicals to remain on the skin or in the workspace. Chemical contamination has serious adverse effects on unprocessed materials, leading to spots, stains, fingerprints etc, on negatives or prints.</p>
Tray processing of films	
Dermal	<p>Qualitative assessment</p> <p>If appropriate gloves are worn no exposure to the skin needs to be expected. However, contact of the fingers with the fixing solution cannot be excluded if no protective gloves are worn or a pair of tweezers are used when putting or removing paper into/from the fixer solution. Due to the black staining of silver ions on the upper epidermis it can be assumed that consumers would wear gloves to avoid this.</p> <p>Furthermore, there is also the aspect of maximising the quality of the photographic images being produced and therefore users will normally not allow uncontrolled chemical contact with the material. Chemical contamination has serious adverse effects on unprocessed materials, leading to spots, stains, fingerprints etc, on negatives or prints. The same goes for greasy fingertips on unprocessed material, allowing the assumption that most of the task will be done using auxiliary tools like tweezers.</p>
Environmental exposure	
<p>The regional environmental assessment for the water and soil compartment did not indicate any risk based on measured data, neither did the sediment compartment based on partitioning from the water column. The only potential source are spills that may occur during the emptying of the tanks into the recycling receptors. A minimal amount in the order of millilitres can be eventually released In such cases, which is subsequent diluted in the overall household water emissions and further diluted to the sewer system to far below any toxicity and even detection level.</p>	
4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES	
Consumer exposure	
Not relevant	
Environmental emissions	
<p>The used photographic solution containing silver ions should be properly collected in closed containers and recycled either by the user or by professional recyclers. Appropriate containment measures should be taken to avoid spilling of used developers' fluid into the sewer system, when filling the recycling receptors.</p>	