

HEALTH & SAFETY INFORMATION

1. IDENTIFICATION

CF42 FIXER

Concentrated photographic fixer designed for manual processing of X-ray films and graphic arts films and papers. Normally diluted 1+4 with water for X-ray working solution and 1+3 for graphic arts films and papers.

Standard packing is 2x5 litre and 4x5 litre plastic bottles in a cardboard box (Packing Code 4G).

The product is manufactured by Photosol at the above address.

In emergency, telephone +44(0)1277 235456 in business hours.

2. COMPOSITION

Major components are as follows. These include those defined as hazardous to health in the Control of Substances Hazardous to Health Regulations, i.e. appear in the Chemicals (Hazard Information & Packaging) (CHIP) Regulations &/or which have a maximum exposure limit or occupational exposure standard in the Health & Safety Executive document EH40. These regulations are themselves based on EC Directives of which 88/379/EEC, 67/548/EEC & 91/325/EEC are particularly relevant.

Component	CAS no.	% w/w	Symbol	Risk Phrases
Water		70		
Ammonium thiosulphate	7783-18-8	20		
Acetic acid	64-19-7	<2		

None of these components are present at concentrations high enough to be regarded as dangerous under the above regulations.

3. HAZARDS

Contact with the eyes or skin may cause irritation because of the mildly acidic nature of the solutions. It is also mildly toxic by ingestion. Sulphur dioxide and acetic acid fumes are emitted slowly from the solution, and inhalation may irritate the upper respiratory tract. A person suffering from asthma may be affected by sulphur dioxide at concentrations as low as 200ppb.

The solution is water based and contains no major environmental pollutants.

4. FIRST AID

Eye Contact: Irrigate the eyes with water for 15 minutes. Ensure all traces are washed out. Seek medical advice.

Skin Contact: Wash affected areas with soap and water as soon as possible.

Ingestion: Wash mouth and throat abundantly with water. Seek medical advice.

Inhalation: Remove the person to fresh air.

5. FIRE-FIGHTING

The solution is water-based and non-combustible. There is no explosion hazard.

6. ACCIDENTAL RELEASE

Personal: Prevent skin and eye contact. Use respiratory and other protection as Section 8.

Environmental: In emergency the solution can be safely disposed to foul sewer by dilution with water (see Section 12).

Cleaning: Excess liquid should be absorbed with sawdust, sand or proprietary methods. Dispose of this material via incinerator or waste contractor.

7. HANDLING & STORAGE

Good general ventilation of ten or more room volume changes per hour in the work area is recommended. Storage should be at moderate temperature i.e., 5-20°C. Keep away from strong acids and alkalis.

8. PERSONAL PROTECTION

In the event of spillage, or when working in close proximity to the solutions (e.g. processor maintenance and cleaning), wear protective clothing. This should comprise an overall, rubber gloves, safety goggles to BS EN 166-3S and a half-mask respirator fitted with an ABEK1 filter which protects against all likely fumes in processing areas including acid gases (such as acetic acid and sulphur dioxide), and ammonia (which may be released if developer and fixer mix).

9. PHYSICAL & CHEMICAL PROPERTIES

<i>Appearance</i>	clear, colourless liquid
<i>Odour</i>	slight vinegary
<i>pH</i>	5.1 (concentrate and working)
<i>Boiling point</i>	>100°C
<i>Melting point</i>	<0°C
<i>Flash point</i>	none
<i>Explosive properties</i>	none
<i>Oxidising properties</i>	none
<i>Vapour pressure</i>	not determined
<i>Specific gravity</i>	1.35 (concentrate), 1.10 (working)
<i>Water solubility</i>	complete
<i>Octanol/water partition</i>	not determined

10. STABILITY & REACTIVITY

The solution is stable and will not polymerise. It is predominantly water.

With strong alkalis it will react vigorously to liberate ammonia, with strong acids it will liberate sulphur dioxide; both are pungent, toxic gases. Thermal decomposition will yield nitrogen, carbon dioxide, and inorganic particulates.

11. TOXICOLOGICAL

The table summarises data for the hazardous components identified in Section 2. Sulphur dioxide is emitted by the solution and so is included in the table, as is ammonia because this will be liberated if the solution accidentally mixes with developer.

	Oral-rat LD₅₀	Occupational Exposure Standard *
<i>Ammonium thiosulphate</i>	2890mg/kg	-
<i>Acetic acid</i>	3310mg/kg	10ppmv
<i>Sulphur dioxide</i>	2520ppm/hr (LC ₅₀)	2ppmv
<i>Ammonia</i>	350mg/kg	25ppmv

mg – milligram

kg – kilogram

M³ – cubic metre

ppmv – parts per million by volume

* the lowest applicable (usually long-term)

LD₅₀ – calculated dose to kill 50% of a population of rats when taken in food or drink

LC₅₀ – calculated airborne concentration to kill 50% of a population of rats.

Acetic acid makes the solution mildly acidic and it may cause skin and eye irritation through contact with the solution or the vapour. Sulphur dioxide will irritate the mucous membranes and upper respiratory tract, and can affect asthmatics at concentrations as low as 200ppb. Ammonia is an eye and mucous membrane irritant with systemic effects through inhalation.

12. ECOLOGICAL

Background

Freshwater ecotoxicity is assessed from the effects of the substance on fish (typically rainbow trout for cold water and bluegill sunfish for warm), invertebrates (Daphnia or waterflea) and algae (especially *Selenastrum capricornutum*). The effects are expressed as 96hrLC₅₀, 48hrEC₅₀ and 72hrIC₅₀ values respectively (L=lethal, E=effect, I=inhibition – referring to C=concentration at which there is 50% inhibition of growth or 50% of the organisms are affected or dead after the specified interval). Units are usually milligrams per litre and any value of 100mg/l or less indicates a toxic substance.

Toxic effects are lessened if the substance degrades rapidly. Biodegradability is considered rapid if the ratio BOD₅/COD is >0.5. (BOD₅ is the biological oxygen demand imposed by the substance on natural water as it degrades over 5 days. COD is the chemical oxygen demand during complete laboratory oxidisation with dichromate. High BOD or COD means a polluting substance likely to kill organisms by depleting oxygen.) Rapid degradation is also assumed if 70% of dissolved organic carbon (DOC) disappears, or if 60% of the theoretical maximum oxygen depletion (OD) or carbon dioxide generation (COG) is achieved, over a 28 day period. Abiotic degradation is also possible, e.g. photolysis.

Toxic effects are accentuated if organisms accumulate the contaminant through either the food chain or absorption from ambient media like water. Bioaccumulation potential is related to the partition of the substance between water and lipids. A useful indicator is the octanol/water partition coefficient expressed as its logarithm (logPow). If logPow ≥3.0 the substance is considered bioaccumulative unless the measured bioconcentration factor (BCF) is ≤100. (The BCF is the ratio of the concentration inside the organism compared to that in the ambient environment).

Data

The table summarises information for constituents with ecotoxicities ≤100mg/l:

		Environmental Pollutant
		<u>Silver ion</u>
toxicity (mg/l)	- LC ₅₀ (fish)	4.8 µg/l
	- EC ₅₀ (Daphnia)	0.6 µg/l
	- IC ₅₀ (algae)	9.3 µg/l
	- interpretation	very toxic
degradability	- BOD ₅ /COD	does not degrade
	- DOC	n/a
	- OD/COG	n/a
	- abiotic	does not degrade
	- interpretation	persists
bioaccumulation	- logPow	neg.
	- BCF	no data
	- interpretation	absent

The theoretical oxygen demand of the concentrate is **360,000mg/litre**.

Comment

Silver is not present in the fresh solution but dissolves from the film during processing. The free silver ion Ag⁺ is extremely toxic (LC₅₀ values etc are *micrograms* per litre) but is hardly present in photo effluent because interaction with other ions complexes it or makes it relatively insoluble. The silver thiosulphate complex in fixers, for example, is 15,000 times less toxic than Ag⁺. In the environment most silver is precipitated and cannot bioaccumulate. Sewage works remove about 95% of the small amount of metal remaining after in-house silver recovery.

13. *DISPOSAL*

Spent fixer will contain silver and should therefore be disposed of via waste contractor or treated to remove the silver before release to foul sewer. Unused solution should be acceptable for direct discharge to sewer provided it is diluted with water. In the case of disposal by waste contractor, both concentrated and diluted fixer is classified 'Special Waste' because they release toxic gas (sulphur dioxide) in contact with strong acid, as may accidentally occur in a waste treatment plant. Empty bottles should be rinsed for safety and to facilitate recycling.

Incineration is not energy efficient as the solution comprises 70% water, but otherwise is a satisfactory method for disposal.

14. *TRANSPORT*

The product is classified non-hazardous for conveyance under the UK Carriage of Dangerous Goods by Road & Rail (Classification, packaging & labelling) Regulations and is unrestricted for international conveyance by sea (IMDG), air (ICAO), road (ADR) & rail (RID). No UN number is required.

15. *REGULATORY INFORMATION*

The product is insufficiently hazardous to be regarded as dangerous in accordance with the Code of Practice for Classification, Packaging and Labelling of Photographic and Lithographic Processing Chemicals (European Photochemical Industry, Sector Group of CEFIC) which complies with but extends the regulations listed in Section 2 above.