

Preserving Contemporary Photographic Materials from 1950 - 2007



Landskonferanse foto
Tromsø 2007

Svart / hvitt negativer og positiver på film og glass

Svart / hvitt - fremkallingspapirer

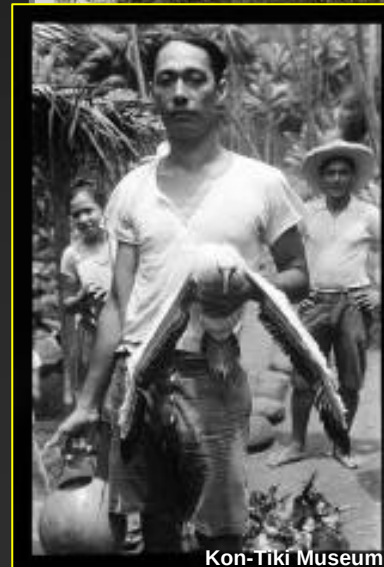
Kromogen farge

Instant photography

Dye destruction process

Gelatin dry plate

- **Oppfinner:** Richard Leach Maddox 1871
- **Tidsperiode:** siden 1878
- **Teknologi/base:** gelatin på glass
- I etterkrigstiden mest brukt til produksjon av glassdias til dokumentasjon og vitenskap
- Lysbildene ble laget fra sort/hvite negativer eller direkte i et kamera
- **Identification:**
 - neutral gray/black image
 - machine cut glass support in standard sizes
 - mostly thinner glass support than wet collodion negatives
 - sharp corners, even cuts
 - even coating
 - sometimes matt varnished and retouched with pencil, red varnish or paint
- **Most common deterioration signs:**
 - flaking off / exfoliation of the emulsion
 - silver mirroring, silver deterioration glass corrosion
 - finger prints with silver mirroring
 - mold attacked areas
 - cracked glass support



Cellulosenitrat

negativer og positiver

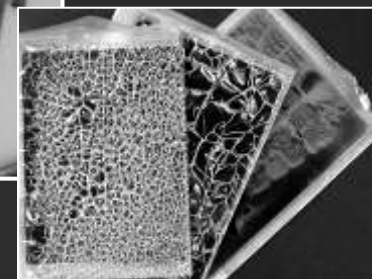
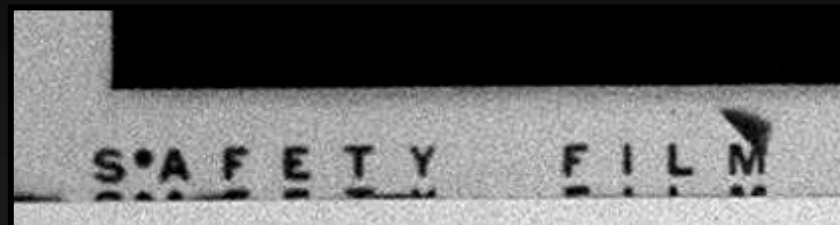
- **Oppfinner:** Hannibal Goodwin pat. US 1887
- **Periode:** 1889 – 1952!
- **Teknologi/base:** gelatin på cellulosenitrat
- **Format:** Storformat, mellomformat, 35 mm
- **Mest kjent for sine aggressive egenskaper når det nedbrytes**
- **Kan forveksles med celulloseacetat**

- **Identification:**
 - known production date before 1920
 - strongly oxidized image, smell of nitric acid and camphor
 - yellowed base
 - burns rapidly in burn test
 - turns deep blue in diphenylamine test
 - sinks in trichloroethylene test
 - edge codes (sometimes used double?)
- **Most common deterioration signs:**
 - deformation of plastic base
 - yellowed plastic base
 - strongly oxidized image
 - silver mirroring, silver deterioration
 - mold attacked areas on gelatin emulsion
 - rapid deterioration if stored in closed, air tight enclosures (in plastic, metal, glass, ...)
 - **danger of self ignition! (especially if stored tight or rolled like in motion picture archives)**



Celluloseacetat negativer og positiver

- **Oppfunnet:** Frankrike 1901
- **Periode:** 1923 - today
- **Teknologi/base :**
 - gelatin på cellulose diacetat 1923,
 - gelatin på cellulose acetat butyrat 1930,
 - gelatin på cellulose triacetate siden 1948
- **Format:** alle, storformat, mellomformat, 35 mm, 16 mm, 8 mm, teknisk film
- Det mest brukte fleksible filmmaterialet til sort/hvitt og farge
- Kan forveksles med nitrat
- Kjent som "safetyfilm"
- Beryktet nedbrytningsprosess kjent som "vinegarsyndrome"
- **Identification:**
 - known production date after 1955
 - edge marking: "safety film" or "safety" (can be copied on nitrate!)
 - smell of vinegar
 - burn test: burns very slow and stops burning when flame goes out
 - floats in trichloroethylene test
 - turns not deep blue in diphenylamine test
- **Most common deterioration signs:**
 - deformation of plastic base, wrinkles (spider web pattern)
 - vinegar odor (vinegar syndrome)
 - silver mirroring, silver deterioration
 - mold attacked areas on gelatin emulsion



Polyesterbase negativer og positiver

- **Introdusert:** 1941
- **Periode:** 1952 – i dag
- **Teknologi/base:** gelatin på polyester
- **Format:** spesialformat, mikrofilm, 35 mm, teknisk film, APS-film, CIBA/Ilfochrome positiver og dias, Kodak Dura,-trans,-flex,-clear,...
- **Sjelden brukt til s/h- eller fargefilm**
- **Benyttet til positive prints, dias (CIBA-chrome, Dura-trans...) eller mikrofilm**
- **Kjemisk meget stabilt, meget holdbart**
- **Identification:**
 - Kodak edge marking: "Estar"
 - polarization test: birefringence / "rainbow color effect"
 - fiber optic effect
 - difficult to tear apart
 - no deterioration of the base
 - burn test: burns very slow and stops burning when flame goes
 - floats in trichloroethylene test
 - turns not deep blue in diphenylamine test
- **Most common deterioration signs:**
 - silver deterioration, silver mirroring
 - colloidal silver spots (micro film)
 - mold attacked areas on gelatin emulsion



polarization test: birefringence

Gelatin fremkallingspapir med eller uten baryttlag

- **Opfinner:** Leo Baekeland
- **Periode:** ca 1885 – i dag
- **Teknologi/base:** gelatinemulsjon på baryttbestrøket papir, gelatinemulsjon på papir
- Tidenes aller mest benyttede fotografiske s/h papir
- Ved riktig behandling og bruk, et meget holdbart fotografisk materiale
- Kjent for sitt vidtrekkende toneomfang og overflatekarakteristika, standardsettende for mange typer fotografiske og digitale trykk materialer
- **Identification:**
 - neutral black color, if toned different kinds of colors are possible (warm and cold black, blue, red, brown, ...)
 - often silver mirroring in the dark image parts
 - thick baryta layer no traces of paper fibers visible
 - sometimes hand colored/ inpainted and retouched
 - glossy or matt surface with many types of surface textures
 - paper structure visible through the gelatin if no baryta layer is used
 - paper is mostly not mounted to a second support
 - single and double weight paper
 - can display no deterioration at all if treated in toner (sulfur-, selenium-, platinum-, gold toner..)
- **Most common deterioration signs:**
 - image fading of the lighter image tones
 - yellowing and fading all over, silver mirroring



Gelatin fremkallingspapir plastpapir / RC paper

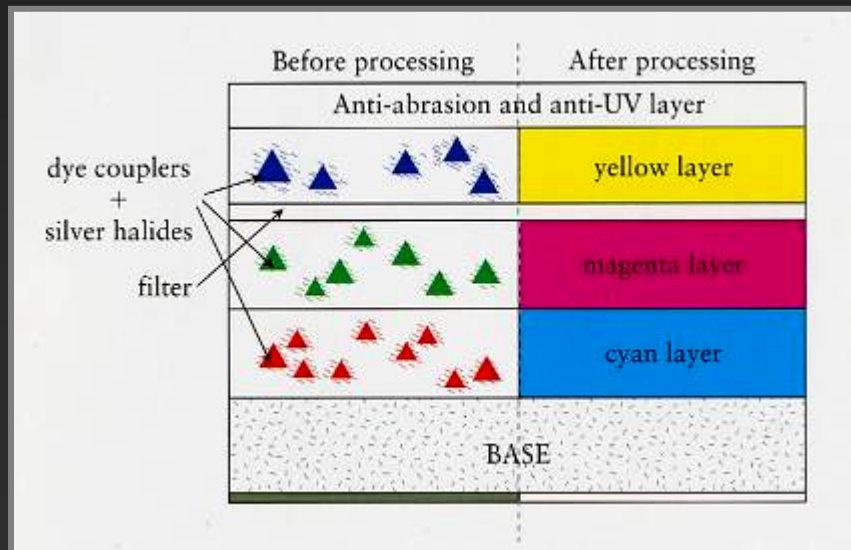
- **Periode:** ultimo 1960 – i dag
- **Teknologi/base:** gelatinemulsjon på polyetylen-bestrøket papir
- **Mest kjent for enkel og tidsbesparende fremkallingsprosess**
- **Kjent for dårlig holdbarhet, særlig når utstilt i glass og ramme**
- **Identification:**
 - neutral black color, if toned different kinds of colors are possible (warm and cold black, blue, red, brown, ...)
 - often silver mirroring in the dark image parts
 - orange/red colloidal silver spots in the dark image areas and on the borders to the brighter image parts
 - polyethylene film on both sides of the paper support (waxy feeling)
 - mostly glossy or matt surface
 - paper structure not visible through the gelatin
 - can display no deterioration at all if treated in toner (sulfur-, selenium-, platinum-, gold- toner...)
- **Most common deterioration signs:**
 - orange/red colloidal silver spots in the dark image areas and on the borders to the brighter image parts
 - silver mirroring
 - bends or folds in the polyethylene film
 - image fading of the lighter image tones
 - yellowing and fading all over



Kåre Kivijärvi, PM-C.

Kromogen farge

- Negativer (C41)
- Dias (Kodachrome/ K14)
- Dias (EKTACHROME, Fuji, AGFA, .../ E6)
- Prints (Chromogenic paper/ RA4)



Kromogen farge

- **Oppfinner:** Rudolph Fischer, pat. 1912/14
Fischer: Chromogenic = “give birth to color”
- **Periode:** 1935/36 – i dag
- **Format:** alle format på plater, film og papir
- **Teknologi:** et bilde av fargestoff (dye) produseres samtidig som et sølvbilde fremkalles (dye coupler process)
- Også s/h siden ca. 1990-tallet (C41 og RA4)
- **Identification:**
 - format
 - color
 - support
 - trademark
 - deterioration
 - edge code
- **Most common deterioration signs:**
 - color fading and color shift
 - sometimes yellow staining
 - vinegar syndrome
 - nitrate deterioration



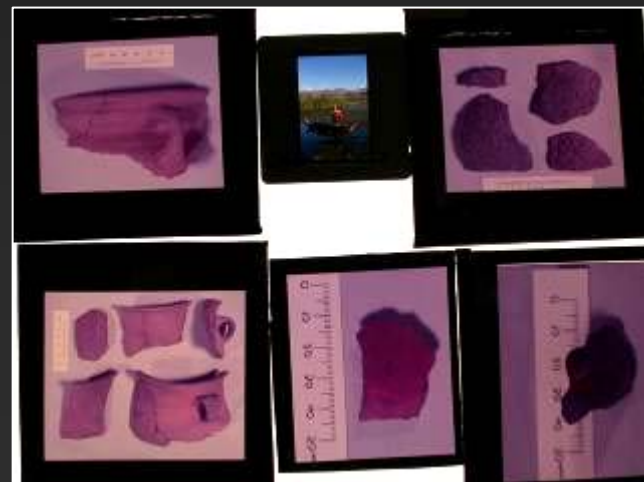
Preus Museum.



H. Renbjør, Levanger Museum.

Kromogene fargedias

- **Oppfinner:** Leopold Godowsky & Leopold Mannes / Kodak 1935/36
Kodachrome , Agfa 1936/37 Agfacolor-Neu
- **Periode:** 1936 – i dag
- **Teknologi/base:** gelatinemulsjon på plastikk (film)
- **Format:** alle format fra 8 mm til storformat og spesialfilm
- **Utseende og egenskaper i forholdt til farger og holdbarhet**
avhenger av film-merke / teknologi, produksjonsdato og fremkallingsprosess
- **Kjølig oppbevaring, + beskyttelse mot lys, er nøkkel til**
bevaring av dette materialet
- **Identification**
 - there is no screen visible under magnification (like in screen processes)
 - there is no printing pattern, pigment traces or dye spots visible under magnification (like for example: inkjet, electrostatic printing, etc.)
 - evenly glossy surface on emulsion side with little visible relief
 - sometimes mounted from the company with printed-on information like:
“Kodachrome or Ektachrome”
 - color grain/dye-clouds visible under high magnification or projection
 - plastic support
 - edge code
- **Most common deterioration signs:**
 - color fading and color shift
 - vinegar syndrome (mostly motion picture)
 - nitrate deterioration (mostly motion picture, 35 mm)



Kromogene fargenegativer

- **Introdusert:** 1939 Agfacolor monopack/ 1942 Kodacolor
- **Format:** alle format fra S8, 16 mm, 35 mm, ... til storformat 18 cm x 24 cm og spesialfilm
- **Utseende og egenskaper i forholdt til farger og holdbarhet** avhenger av film-merke / teknologi, produksjonsdato og fremkallingsprosess
- **Kjølig oppbevaring** er nøkkel til bevaring av dette materialet
- **Identification:**
 - color negatives show a all over cast of residual dye densities to balance the printing effect of the cyan and magenta dyes which do not have good absorption or transmission properties. These dyes are visible over the whole negative as a pinkish or orange/brown color.
- **Most common deterioration signs:**
 - color fading and color shift
 - sometimes yellow staining
 - vinegar syndrome
 - nitrate deterioration



Kromogene fargebilder (prints)

- **Introdusert:** 1942,
 - inntil 1970 på baryttbasert papir eller hvit acetat, etter 1970 på RC-papir
 - I Øst Europa inntil 1990 på baryttbasert papir
- **Utseende og egenskaper i forholdt til farger og holdbarhet avhenger av papir-merke / teknologi, produksjonsdato og fremkallingsprosess**
- **Tidenes aller mest benyttede fargefotografiske papir**
- **Kjølig oppbevaring, + beskyttelse mot lys, er nøkkel til bevaring av dette materialet**
- **Identification:**
 - before 1969 on a baryta base paper or plastic (acetate) since the 1969 printed on RC-paper (waxy feel)
 - on the back of the print, the company name or brand name is often printed on (Konica, AGFA, Kodak Royal, Fuji crystal archive,...)
 - there are no printing pattern, pigment traces or dye spots visible under magnification (like for example: inkjet, electrostatic printing, Fuji Pictography, etc.)
 - evenly glossy or matt, sometimes textured (raster)
 - sometimes face mounted on acrylic glass
- **Most common deterioration signs:**
 - color dark-fading: purple brown prints
 - color light-fading: cyan green prints
 - coupler staining: yellowed white areas and edges
 - typical band or folding damages of polyethylene support (RC-paper base)



Polaroid sort/hvit

Polaroid farge

- **Oppfinner:** Edwin Land /Polaroid Co.
- **Periode:** - sort/hvit siden 1947 – i dag; farge siden 1963 – i dag
- **Teknologi:** Diffusion transfer process
- **Formats:**
 - peel apart film 3 ¼ x 4 ¼ inch up to extra large land format
 - peel apart film 4 x 5 inch print and negative in on step
 - single sheet SX 70 (since 1972), i-zone, ...
- Tradisjonelt kjent som (inntil 1990-åra) den kjappe måten å komme frem til et positivt papirbilde, men lite bestandig
- Mest brukt av profesjonelle fotografer men også brukt i forhold til dokumentasjon innen f.eks. vitenskap, politiet / offentlig sektor, samt av amatørfotografer og kunstfotografer
- Ikke vanlig å finne i arkiver, kanskje pga dets dårlige holdbarhet, vanligere i kunstsamlinger
- Identification:
 - typical formats of SX 70, i-zone, black backside
 - white edge on front side of peel apart with removable (pre perforated) “grip track-through part”
 - gray back side at the peel apart
 - peel apart B&W: highlights are more creamy than in standard black and white prints
 - manufacture code and film type printed on reverse
 - developer traces on edges of large peel apart prints
- **Most common deterioration signs:**
 - image fading / color fading
 - cracks in image layer if stored very dry, delamination of single sheet film (SX 70,...)



CIBA chrome / Ilfochrome

- **Oppfinner:** Ciba-Geigy
- **Periode:** 1958 - today
 - Sort/hvitt siden 1947 – i dag
 - farge siden 1960-tallet – i dag
- **Technology:** dye destruction process; dyes become susceptible to bleaching when a silver image is developed (azo dyes are used)
- **Format:** Alle kjente format
- Langt bedre fargegjengivelse, briljans og høyglans enn tradisjonelle kromogene fargebilder (prints)
- Innen profesjonell fotografi kjent som en av de beste måtene å få et perfekt bilde av en fargetransparent (color transparency)
- Er mer motstandsdyktig mot lyspåvirkning enn øvrige fargematerialer, har også større glans
- Mest brukt innen reklame- og kunstoffotografi, -sjelden i arkiver, vanligere i kunstsamlinger

Identification:

- mostly very glossy
- metallic sheen in highlights
- printed mostly on polyester but also on RC-paper
- early examples are printed on white pigmented acetate base
- typical metallic sound of polyester carrier
- **Most common deterioration signs:**
 - image fading / color fading
 - indentations and folds in plastic carrier



Fotografiske teknikker 1950 - 2007

Kategori	Type / media / base	Periode
Svart / hvitt negative og positive	Gelatin tørrplate	siden 1878
	Cellulose nitrat	1889 – 1952!
	Cellulose acetat	siden 1920
	Polyesterbase film	siden 1950
Svart / hvite – fremkallingspapirer	Gelatin fremkallingspapir på baryttpapir	siden 1885
	Plastpapir (RC paper)	siden slutten 1960-tallet
Chromogenic color	Kromogen diasfilm	siden 1935
	Kromogen negativfilm	siden 1939
	Kromogene papirer	siden 1942
Instant photography	Polaroid sort/hvitt	siden 1947
	Polaroid instant farge	siden 1963
Dye destruction process	CIBA/Ilfo-chrome	siden 1958

DIGITAL IMAGING

PRINT MATERIAL:

- chromogenic paper and film (Color or B&W), Ilfo-chrome, B&W - Gelatin DOP, instant color, ... [Laserchrome, Lambda print, Laser jet, ...]
- Fuji pictography
- Thermal dye transfer
- Inkjet on all kinds of supports with all kinds of inks
- laser printout
- ...



Kraus/Padeste 2003

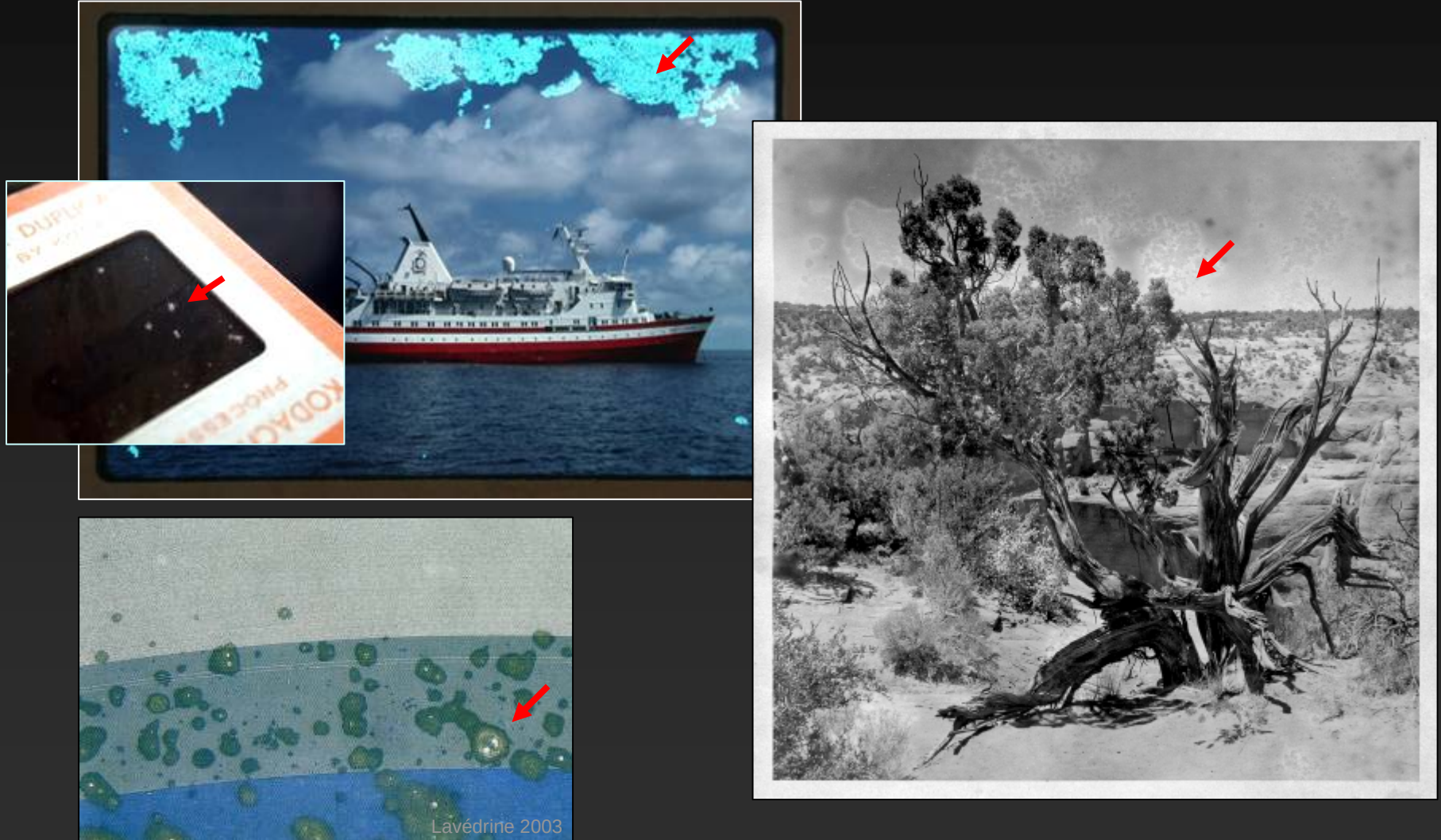
Bildene varer, avhengig av materialene, men også av deg



Skader forårsaket av klimaendringer



Mugg, insekter, mikroorganismer,...

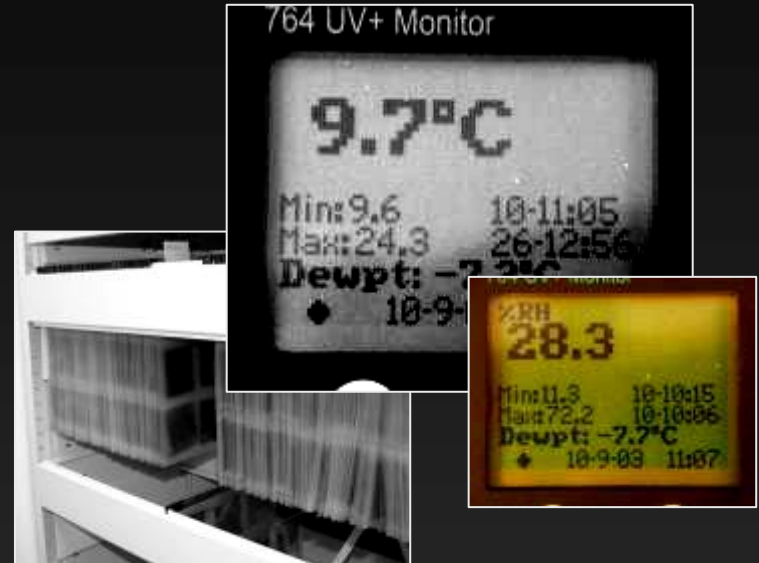


Anbefalinger

Riktig håndtering og oppbevaring forlenger fotografiernes liv

International Standardization Organization (ISO) og American National Standards Institute (ANSI) har meget gode anvisninger når det gjelder oppbevaring og håndtering; omslag / fotolommer / esker, hyller, lagerrom, miljømessige betingelser; temperatur, fuktighet, lys, ...

Se standardene ISO 10356, 18902, 18911, 18918, 18920, og / eller ANSI/NAPM IT 9.2, 9.11, 9.18, 9.20



Oppbevaringsmiljø

temperatur og relativ luftfuktighet

Recommended temperature and relative humidity [RH] for color and black and white materials [ISO 18911:2000, ISO 18918: 2000, ISO 18920:2000]

Material	Temperature in °C ± 2 °C fluctuation in 24 h	Relative humidity RH in % ± 5 % fluctuation in 24 h
glass plate negatives	≤ 18	30 - 40
black and white film	≤ 21	20 - 30
black and white paper	≤ 18	30 - 50
chromogenic color film	≤ - 10	20 - 50
chromogenic color paper	≤ 2	30 - 40
dye destruction process /CIBA-/Ilfochrome	≤ 18	30 - 50

Long term storage conditions for optical digital disks with polymer substrate (ISO 16111)

recommended Temperature	recommended relative humidity
5 - 20 °C ± 1°C fluctuation in 24 h	20 – 50 % ± 5 % fluctuation in 24 h

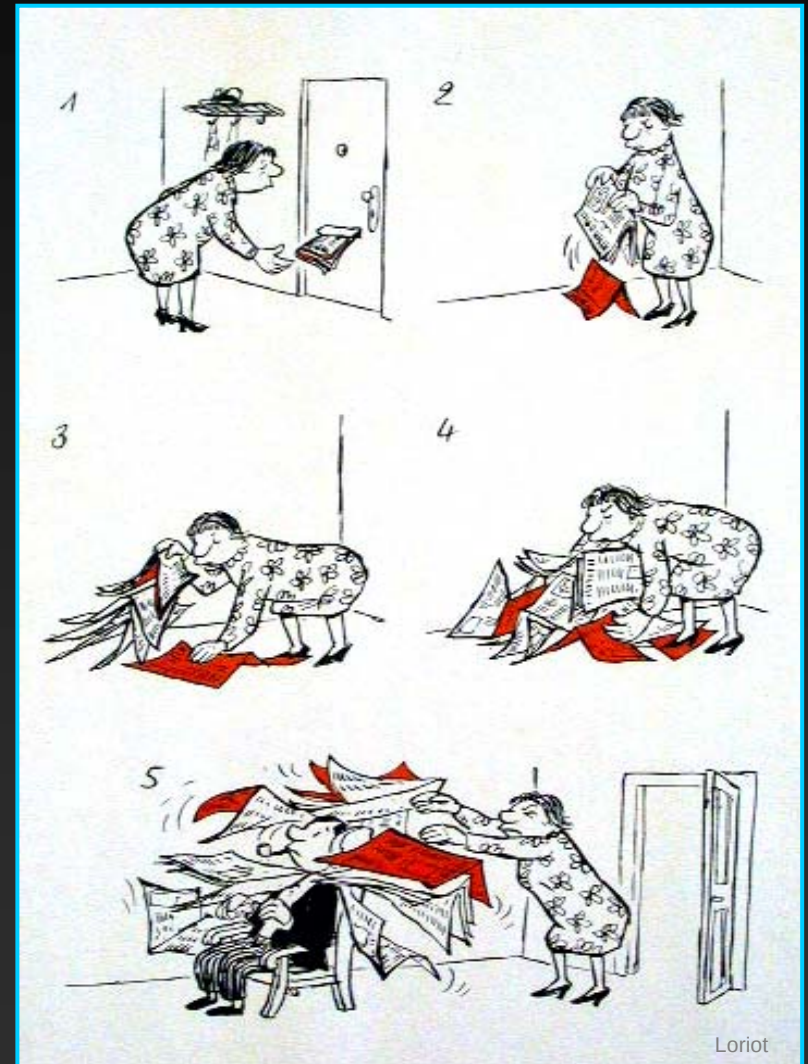
Anbefalinger



Informasjon

Workshops i fotobevaring hos
Preus museum:

- Identifisering av fotografiske teknikker
- Identifisering av digitale trykk teknikker
- Fotohistorie
- Håndtering av fotografiske materialer
- Valg av forpakkingsmaterialer
- Oppbevaring
- Valg av presentasjonsmaterialer og belysning
- Planlegging og gjennomføring av bevaringsprosjekter
- ...



Tusen takk!



Lorient

Jens Gold

fotokonservator / Conservator of Photographs

Preus museum

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Telephone: +47 33 03 16 37

Fax: +47 33 03 16 40

E-mail: jens.gold@preusmuseum.no

Web-Site: www.preusmuseum.no

calvin and hobbes

by WATTERSON

NOW, HONEY, YOU'RE MISSING A BEAUTIFUL SUNSET OUT HERE!



I'LL COUNT TO 10, AND THEN...
POW!



DAD, HOW COME OLD PHOTOGRAPHS ARE ALWAYS BLACK AND WHITE? DIDN'T THEY HAVE COLOR FILM BACK THEN?



SURE THEY DID. IN FACT, THOSE OLD PHOTOGRAPHS ARE IN COLOR. IT'S JUST THE WORLD WAS BLACK AND WHITE THEN.



REALLY?

YEP. THE WORLD DIDN'T TURN COLOR UNTIL SOMETIME IN THE 1930s, AND IT WAS PRETTY GRAINY COLOR FOR A WHILE, TOO.



THAT'S REALLY WEIRD.

WELL, TRUTH IS STRANGER THAN FICTION.



BUT THEN WHY ARE OLD **PAINTINGS** IN COLOR? IF THE WORLD WAS BLACK AND WHITE, WOULDN'T ARTISTS HAVE PAINTED IT THAT WAY?

NOT NECESSARILY. A LOT OF GREAT ARTISTS WERE INSANE.

BUT...BUT HOW COULD THEY HAVE PAINTED IN COLOR ANYWAY? WOULDN'T THEIR PAINTS HAVE BEEN SHADES OF GRAY BACK THEN?

OF COURSE, BUT THEY TURNED COLORS LIKE EVERYTHING ELSE DID IN THE '30s.



SO WHY DIDN'T OLD BLACK AND WHITE PHOTOS TURN COLOR TOO?

BECAUSE THEY WERE COLOR PICTURES OF BLACK AND WHITE. REMEMBER?



THE WORLD IS A COMPLICATED PLACE, HOBBS.

WHenever IT SEEMS THAT WAY, I TAKE A NAP IN A TREE AND WAIT FOR DINNER.

