



Eco Mark Product Category No. 132

“Toner Cartridge Version 1.4”

Japan

Environment Association

Eco Mark Office

1. Environmental Background

In 2002, the sales of toner cartridges used for printers, copiers, and facsimiles in Japan were estimated to total 17 million units (source: Inter Watch Corporation). The market shows an upward trend with the increasing sales of machine bodies. Meanwhile businesses are showing growing interest in the recycling of used toner cartridges, and this has led to the extensive distribution of recycled toner cartridges.

In early 2003, the Asia Four Label Mutual Recognition Project successfully established common core criteria that mutually certify the eco labels of Korea, Thailand, Taiwan, and Japan based on the agreement of the respective eco labeling secretariats in each country. Defining toner cartridges as original, refilled, and remanufactured toner cartridges, the criteria aim to reduce environmental impact during the manufacture, use, and disposal of toner cartridges. Given that the respective eco labeling secretariats of each country have agreed on the outline of the criteria, and foundations for mutual recognition have more or less been established, the Eco Mark program has also decided to promote the use of eco-friendly toner cartridges in printers, copiers, and facsimiles in Japan by setting a product category for toner cartridges.

In the present review, it was decided that toner cartridges shall be re-examined to give a general evaluation, which is based on the common core certification criteria and the concept of product life cycle. This evaluation incorporates aspects such as reducing environmental impact risks of chemical substances, repeated use, recovery, and recycling, while also taking into consideration social circumstances unique to Japan.

Eco Mark Product Categories No.117 “Copiers” and No.122 “Printers” focus mainly on the actual machines themselves. Although basic criteria on toner cartridges are prescribed in these categories, most are limited to the toner and container. Thus in the present review, it was decided that certification criteria shall also be prescribed on services related to toner cartridges such as refilling and recycling, and adjustments shall be made for consistency with other product categories, taking into consideration how toner cartridges are sold with machines such as printers, etc.

NOTE: This document is a translation of the criteria written in Japanese. In the event of dispute, the original document should be taken as authoritative.

2. Applicable Products

Toner cartridges used in printers, copiers, facsimile machines, and multifunctional copiers, etc., which are based on the electrophotography method apply. If cartridges consist of photo development units and photosensors, however, applicable products are limited to those sold together with toner containers as a set. Toner containers, photosensors, and photo development units that are sold separately are outside the scope of this product category.

3. Terminology

- Toner cartridge: Cartridge for printing composed of two or more of the following: photosensor, photo development unit, and toner container filled with toner for electrophotographic printers, copiers, facsimile machines, multifunctional copiers, etc.
- Original toner cartridge: Cartridge manufactured by copier manufacturers or manufactured on consignment by copier manufacturers.
- Remanufactured toner cartridge: Used toner cartridges refilled with toner and whose expendable parts have been replaced as required.
- Prescription constituents: Components intentionally added with the purpose of providing specific characteristics to the product. Impurities that inevitably enter during the manufacturing process are excluded.
- Plastic: Material composed of single or multiple polymers, plus additives, fillers, etc. which are added to the polymer(s) to give specific characteristics.
- Polymer: High molecular material which is a major constituent of the plastics.
- Homopolymer: Single polymer. Polymer of a single kind of monomer.
- Copolymer: Polymer of more than two kinds of monomer.
- Polymer alloy (Polymer blend): Polymer Alloy (Polymer Blend): Generic name of multi element system high molecule obtained by mixture or chemical combination of high molecules more than two elements. Physically mixed different kind of high molecule is called a polymer blend.
- Pre-consumer material: Materials or rejects obtained from the waste route during the manufacturing process. However, this excludes those recycled within the same process as the raw material (same plant).
- Post-consumer material: Materials or products disposed after used as a product.
- Reused parts: Parts that have previously been used.
- Material recycling: Recycling of material, excluding the recovery of energy, conversion to oil, gasification, blast furnace reduction, and conversion to chemical materials by coke oven.
- Recycling rate: Weight percentage of the used product transferred to the recycling

process after use, disposal, and collection for the purpose of recycling; or weight percentage of parts of the toner cartridge collected that are reused, material recycled, energy recovered, converted to oil, gasified, or subject to blast furnace reduction or conversion to chemical materials by coke oven.

- Reuse/material recycling rate: Weight percentage of the used product transferred to the recycling process after use, disposal, and collection for the purpose of recycling; or weight percentage of parts of the toner cartridge collected that are reused or material recycled.
- Percentage of waste paper in the pulp mixture: Weight percentage of waste pulp contained in the product. Expressed by (waste paper pulp) / (virgin pulp + waste paper pulp) x 100 (%). However, the weight of the pulp is measured under the condition of containing 10% moisture.
- Photosensor: With photoconductivity, it records images (optical information images) as electrostatic potential images. Comes in drum, sheet, or belt shapes. Called photosensitive drum or photosensitive belt.
- Development unit: Device which can develop and visualize electrostatic potential images formed on the photosensor surface.

4. Certification Criteria

4-1. Environmental criteria

Products shall meet all appropriate requirement of 4-1-1. Products including expendables, instruction manuals, and packaging prescribed in 4-1-2 to 4-1-4 shall also meet all appropriate requirements.

4-1-1. Common criteria

- (1) The production process shall not violate for previous five years relevant environmental regulations and agreements on preventing air pollution, water contamination, noise, odor and emission of hazardous materials.
- (2) Solvents shall not use the specific chlorofluorocarbons (five CFCs), other CFCs, carbon tetrachloride, trichloroethane, and CFC substitutes (HCFCs), given in Attachment 1, in the final manufacturing stage as well as the final supply stages of products (toner cartridges) or circuit boards.

- (3) When toner cartridges are loaded in machines, the emission of dust into the atmosphere shall not exceed the density of 0.075 mg/m³ during continuous two-hour operations. Dust density shall be measured as designated in the Japan Business Machine Industry Association standards (JBMS-66) or under the test conditions prescribed in Blue Angel RAL-UZ62; 2002 Appendix 3. Furthermore, measurement under test conditions described in the Blue Angel RAL-UZ62/85/114; 2003 Appendix 4 or RAL-UZ-122;2006 Appendix 2 shall be allowed, and in this case, dusts during copying operations shall not exceed the dispersion speed of 4.0mg/h.
- (4) When toner cartridges are loaded in machines, the emission of styrene into the atmosphere shall not exceed the density of 0.07mg/m³. Styrene density shall be measured as designated in the Japan Business Machine Industry Association standards (JBMS-66) or under the test conditions prescribed in Blue Angel RAL-UZ62; 2002 Appendix 5. Furthermore, measurement under test conditions described in the Blue Angel RAL-UZ62/85/114; 2003 Appendix 4 or RAL-UZ-122;2006 Appendix 2 shall be allowed, and in this case, styrene during copying operations shall not exceed the dispersion speed of 1.0mg/h.
- (5) The photoreceptor of products shall not contain cadmium, lead, mercury and selenium as prescription constituents.
- (6) To ensure that products can be disassembled easily, the following points “a.” to “e.” shall be met. However, this applies only to replaced parts of recycled toner cartridges.
 - a. Modules making up products shall be easily separable.
 - b. There must be sufficient space to insert tools at fixing points/dismantling points.
 - c. Joint between different materials shall be easy to find.
 - d. Non-separable joints such as glued or welded joints between different materials may not be used (for case parts and chassis).
 - e. IC chips or other devices that prevent disassembly and reuse shall not be used.
- (7) Systems for recovering and material recycling products shall be available. The reuse and material recycling percentage of the original and recycled toner cartridge parts recovered of the total product weight (excluding the toner) shall be over 50% and over 75%, respectively.
- (8) The recycling percentage of recovered toner cartridge parts shall be over 95% of the total product weight (excluding the toner). Parts of recovered products that cannot be recycled shall be disposed by eco-friendly methods.

- (9) Packages of the cartridge, printed documents enclosed with the cartridge, or instruction manuals of the machine product shall indicate the following information (“a.” to “k.”) clearly:
- a. Name of the product under application
 - b. Company name of applicant (or brand name)
 - c. Contact telephone number
 - d. Product recovery method for users to return used products
 - e. Classification of recycled toner cartridge
 - f. Correct use of product
 - g. Information on after-sales service for users
 - h. Not opened with force
 - i. In the event toner dust leaks out due to inappropriate handling, avoid inhaling the dusts and contact with skin.
 - j. Measures should the toner adhere to clothing or hands, or enter eyes or mouth.
 - k. Should be stored in places out of reach of children, and measures when children drink the toner by accident
- (10) Information on product use shall be provided on machines and various models to users clearly on packaging, pamphlets, and company websites. Information on how users can acquire the latest information on applicable machines and models shall also be provided.
- (11) The product shall be clearly labelled with the following:
- a. Name of the product under application
 - b. Company name of applicant (or brand name)
- (12) Plastic products shall be made of one homopolymer or copolymer. However, polymer blends (polymer alloys) can be used. If labels, markings, or stickers are not easy to separate, these shall be of the same materials as the portion on which they are pasted, or shall satisfy VDI2243:1993 Part 1,30/42(Attachment 2) 1, 2, or 3. This applies only to replaced parts of recycled toner cartridges.
- (13) Cadmium, lead, or mercury shall not be added to plastic parts as prescription constituents, except for electrical and electronic parts including wires. This applies only to replaced parts of recycled toner cartridges.
- (14) Polybrominated biphenyls (PBBs), polybrominated diphenyl ethers (PBDEs) and chlorinated paraffin (chain carbon number of 10 to 13 and chlorine density of over 50%) shall not be added to plastic parts as prescription constituents. This applies only to replaced parts of recycled toner cartridges.

- (15) Plastic parts shall be marked in accordance with ISO11469, except for products that are less than 25g, parts whose smooth area is less than 200 mm², and reused plastics. This applies only to replaced parts of recycled toner cartridges.
- (16) Products shall be sealed during storage or handling to prevent leakage of toner.
- (17) Product design shall conform to “3R design” on Attachment 3. This item shall apply only to parts of recycled toner cartridges replaced.
- (18) Recycled toner cartridges shall comply with the “Recycled toner cartridge” defined in 3. Terminology.

4-1-2 Criteria for expendable portions

A. Criteria for toners

- (19) As to heavy metals used on toners, cadmium, lead, mercury, chromium(VI), nickel and compounds shall not be used as prescription constituents.
- (20) Azo colorants (dyes or pigments) of toner that degenerate into one or more of the amines listed in Attachment 3 through decomposition of one or more azo compounds shall not be used (in accordance with the official test method compilation based on the German Law on Foods and Sundries Article 35).
- (21) Other hazardous substances related to toners shall not contain the following (“a.” to “d.”) substances as prescription constituents:
 - a. The following substances which need to be labelled as “R” in accordance with Attachment I of the EC Commission Directive 67/548/EEC, which deals with the comparison of laws, regulations and administrative rules on hazardous substances classifications, packaging, and labelling in the EU.
 - R40 (Limited evidence of a carcinogenic effect)
 - R45 (May cause cancer)
 - R46 (May cause heritable damage)
 - R49 (May cause cancer by inhalation)
 - R60 (May impair fertility)
 - R61 (May cause harm to the unborn child)
 - R62 (Possible risk of impaired fertility)
 - R63 (Possible risk of unborn child)
 - R68 (May impair fertility)

- b. Substances classified as carcinogenic (groups 1, 2A, 2B) by IARC (International Agency for Research on Cancer). Excludes carbon black.
 - c. Substances requiring labelling of the designated symbols on the whole product in accordance with “Attachment II of the EC Commission Directive 67/548/EEC”, which deals with the comparison of laws, regulations and administrative rules on hazardous substances classifications, packaging, and labelling in the EU and “EC Commission Directive 1999/45/EC”, which deals with the comparison of laws, regulations and administrative rules on hazardous dispensing classifications, packaging, and labelling.
 - d. Substances requiring labelling of the designated R43 warning (risk of causing inflammation in skin contact) on the whole product in accordance with Attachment III of the EC Commission Directive 67/548/EEC, which deals with the comparison of laws, regulations and administrative rules on hazardous substances classifications, packaging, and labelling in the EU.
- (22) Toner shall give a negative result in the Ames test.
- (23) Products shall be equipped with the toner MSDS (Material Safety Data Sheet).

~~4-1-3 Criteria for instruction manuals~~

~~(24) Instruction manuals shall conform to Eco Mark Product Category “Paper Printed Matter”. The use of hot melt adhesives is not prohibited. If printed overseas, no chlorine gas shall be used during the pulp bleaching process and the binding method shall not impede waste paper recycling.~~

4-1-4 Criteria on packaging material

- (25) Packaging material shall not use the specific chlorofluorocarbons (five CFCs), other CFCs, carbon tetrachloride, trichloroethane, and CFC substitutes (HCFCs), given in Attachment 1.
- (26) Resins composed of halogens and organic halogenides shall not be added to plastic materials used in packaging as prescription constituents.
- ~~(27) Cardboard used for packaging shall contain over 50% waste paper pulp.~~
- (28) Packaging materials shall conform to the “Guidelines on Compilation of Pre-Evaluation Manuals in Product Design for Promoting Use of Recycled Resources” (July 1994, Waste Treatment and Recycling Committee, Industrial Structure Council).

4-2 Quality criteria

- (29) The printing capacity of the recycled toner cartridge shall less than 90% of the original model. Use the following equations in calculations:
Number of sheets which can be printed with original cartridge: C1

$$C1 \text{ (in sheets)} = ((M1-M2)/(M1-M3)) \times 1000$$

M1: Weight of original cartridge

M2: Weight of original cartridge after use

M3: Weight of toner cartridge after printing on 1000 A4-size sheets at 5% of the effective range

Number of sheets which can be printed with a remanufactured cartridge: C2

$$C2 \text{ (Number of sheets)} = ((M4-M5)/(M4-M6)) \times 1000$$

M4: Weight of original recycled cartridge

M5: Weight of recycled cartridge after use

M6: Weight of toner cartridge after printing on 1000 A4-size sheets at 5% of the effective range

$$\text{Printing capacity percentage (\%)} = (C2/C1) \times 100$$

- (30) Quality shall be managed in accordance with in-house regulations. Quality assurance shall be provided to deal with poor print quality, jamming, toner leakage, body corruption and other poor quality conditions. Quality control shall also be thorough in the manufacturing stage.

5. Certification Procedure

- (1) For criterion 4-1(1), a certificate by the manager of the plant manufacturing the product shall be submitted to certify that relevant local environmental laws, regulations, etc. have been observed with no violation for the last five years before the filing of the application.
- (2) For criterion 4-1(2), a certificate issued by the supervisor or plant manager of the manufacturer of the product or final circuit board supplier shall be submitted.
- (3) For criterion 4-1(3), documents and measured values certifying compliance to the measurement methods in JBMS-66 or RAL-UZ62 Annex 3 shall be submitted.
- (4) For criterion 4-1(4), documents and measured values certifying compliance to the measurement methods in JBMS-66 or RAL-UZ62 Annex 5 shall be submitted.
- (5) For criterion 4-1(5), a list indicating whether the concerned substances are added shall be submitted.
- (6) For criterion 4-1(6), a checklist on "a." to "e." shall be submitted.
- (7) For criterion 4-1(7), a certificate indicating the total product weight (excluding the toner), reuse of parts, parts, material recycling purpose, etc. shall be submitted.
- (8) For criterion 4-1(8), Documents describing the recycling percentage and that eco-friendly processing and disposal systems are available (collection system, processing ability, and processing details, etc.) shall be submitted.
- (9) For criteria 4-1(9)-(11), required documents and materials such as relevant portions of instructions manuals carrying the designated information, packaging, printed materials for advertisement, URL of relevant portions of websites, photographs of relevant portions, samples, etc. shall be submitted.
- (10) For criterion 4-1(12), documents certifying conformance to this requirement and list of plastic materials used shall be submitted.
- (11) For criteria 4-1(13)-(14), it shall be clarified in parts purchase contracts, etc. that the concerned substances are not added.

- (12) For criterion 4-1(15), documents certifying conformance to the plastic marking parts list or ISO11469 shall be submitted.
- (13) For criterion 4-1(16), conformance to this item shall be indicated in the attached certificates.
- (14) For criterion 4-1(17), conformance to this item shall be indicated in the attached certificates, and at the same time the necessary particulars shall be filled in attachment 4 "3R design" and submitted.
- (15) For criterion 4-1(18), a certificate issued by the supervisor or plant manager of the manufacturer of the product, which indicates that the used cartridge is refilled with toner and that consumables are replaced as appropriately, shall be submitted.
- (16) For criteria 4-1(19)-(21), a list indicating whether the concerned substances are added, issued by the toner supplier, shall be submitted.
- (17) For criterion 4-1(22), the Ames test report shall be submitted in accordance with laws on the regulations of chemical substance screening and manufacturing, etc.
- (18) For criterion 4-1(23), the MSDS issued by the toner supplier shall be submitted.
- ~~(19) For criterion 4-1(24), documents describing conformance to each criterion in the Eco Mark Product Category "Paper Printed Matter" shall be submitted. If the product is printed overseas, descriptions certifying that no chlorine gas is used during the pulp bleaching process, and that materials listed as impeding waste paper recycling are not used shall be added.~~
- (20) For criterion 4-1(25), a certificate issued by the supervisor or plant manager of the manufacturer of the packaging material shall be submitted.
- (21) For criterion 4-1(26), a certificate issued by the manufacturer of the packaging material consisting of a list of plastic materials used for the packaging, which clarifies whether the raw material manufacturer name, resins including halogen, and organic halogenides have been added shall be submitted.
- ~~(22) For criterion 4-1(27), a certificate issued by the manufacturer of the cardboard packaging material shall be submitted. The certificate shall indicate the waste paper pulp content rate.~~
- (23) For criterion 4-1(28), conformance to guidelines shall be indicated. Specifically, a.) packaging material shall be selected according to the packaging material evaluation manual compiled based on the guidelines (also submit materials that describe the contents of the manual (list of contents, etc.)); and b.) names of material used shall be submitted.
- (24) For criterion 4-2.(29), the calculated printing ability shall be indicated in the Application Form for Eco Mark Certification and Usage.

Tests shall be repeated three times or more, but the number of machines that are used in the test is not specified. The machine used for the calculation of C1 and C2 shall be the same. "After use" prescribed in M2 and M5 of 4-2 (29) means: when white lines occur due to toner shortage after the start of test, the cartridge is removed and shaken 5 and 6 times to even the toner; the test is resumed after this work; and the point when white lines occur the second time is defined as "after use". The weight of original and recycled cartridges at this point is defined as M2 and M5, respectively.

(25) For criterion 4-2.(30), a copy of appropriate product documentation on quality assurance shall be submitted. If quality assurance is provided for toner cartridges as part of the machine, a copy of manual(s) of the machine including the list of contacts, such as customer center, for trouble shooting of the equipment can be admitted. The applicant is needed to submit documents describing the method of quality assurance upon request of the review committee.

Certificates and declarations issued by the manager of the plant manufacturing the product that quality control is implemented in the manufacturing stage based on in-house regulations, and that only products passing quality inspections are shipped shall be submitted. Certificates indicating that the quality control system is established shall be submitted. (Copies are acceptable if the applicant has obtained ISO 9001 or 9002.).

6. Other Requirements

- (1) Products shall be grouped by product type (original/recycled) indicated in Applicable Products and by model. However, products are not categorized by toner volume and according to the four component colors (yellow, cyan, magenta, and black) among the same color toner cartridges for color copiers.
- (2) In the event Eco Mark is already labeled on recycled toner cartridges, they shall be removed and replaced with the Eco Mark based on the sort of certification acquired by the applicant.
- (3) The following environmental information shall be indicated below the mark. The location and details of the Eco Mark to be indicated shall be submitted when applying for Eco Mark product certification and use. The environmental information indicated shall consist of two lines aligned to the left and enclosed in a rectangular box. The first line shall read, “**部品を再使用・再資源化する** (Parts shall be reused/recycled)” for original toner cartridges defined in 3. Terminology, and “**再生トナーカートリッジ** (Recycled toner cartridge)” for recycled toner cartridge. For both original and recycled toner cartridges, the second line shall read “**回収ルート確立** (Recovery route available)”.

The following are examples:

[Original toner cartridge]



(Indication of numbers only is allowed)

[Remanufactured toner cartridge]



(Indication of numbers only is allowed)

- (3) The Eco Mark labeling method shall be used in accordance with Eco Mark Usage Regulations Article 7 separately prescribed based on the Guidelines for Eco Mark Program Implementation.
- (4) In principle, the products to be applied shall be free of “flame retardant”, “antibacterial agent” materials and “biodegradable plastic” indication. When using these materials reasoning special circumstances, however, the products shall satisfy the provisions contained in the “Eco Mark Business Execution Guideline” concerning “flame retardant”, “antibacterial agent” and “indication of biodegradable plastic”. Specifically, the use of these materials shall be described in the Application Form for Eco Mark Certification and Usage with documents stipulated in the form to be attached.

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Revised: Feb. 14, 2008 (Ver1.4)

Term of validity: March 14, 2010

The certification criteria of this product category will be revised as required.

Attachment 1 Substances provided in 4-1-1.(2)

5 CFCs	Trichlorofluoromethane	HCFCs	Chloropentafluoropropane
	Dichlorodifluoromethane		Tetrachlorofluoropropane
	Trichlorotrifluoroethane		Trichlorodifluoropropane
	Dichlorotetrafluoroethane		Dichlorotrifluoropropane
	Chloropentafluoroethane		Chlorotetrafluoropropane
Other CFCs	Chlorotrifluoromethane		Trichlorofluoropropane
	Pentachlorofluoromethane		Dichlorodifluoropropane
	Tetrachlorodifluoroethane		Chlorotrifluoropropane
	Heptachlorofluoropropane		Dichlorofluoropropane
	Hexachlorodifluoropropane		Chlorodifluoropropane
	Pentachlorotrifluoropropane		Chlorofluoropropane
	Tetrachlorotetrafluoropropane		
	Trichloropentafluoropropane		
	Dichlorohexafluoropropane		
	Chloroheptafluoropropane		
	Carbon Tetrachloride		
	1,1,1-Trichloroethane		
HCFCs	Dichlorofluoromethane		
	Chlorodifluoromethane		
	Chlorofluoroethane		
	Tetrachlorofluoroethane		
	Trichlorodifluoroethane		
	Dichlorotrifluoroethane		
	Chlorotetrafluoroethane		
	Trichlorofluoroethane		
	Dichlorodifluoroethane		
	Chlorotrifluoroethane		
	Dichlorofluoroethane		
	Chlorodifluoroethane		
	Chlorofluoroethane		
	Hexachlorofluoropropane		
	Pentachlorodifluoropropane		
	Tetrachlorotrifluoropropane		
	Trichlorotetrafluoropropane		
	Dichloropentafluoropropane		
	Chlorohexafluoropropane		
	Pentachlorofluoropropane		
	Tetrachlorodifluoropropane		
	Trichlorotrifluoropropane		
	Dichlorotetrafluoropropane		

Attachment 2 VDI2243: 1993 Part 1, Part1, 30/42
Conformance of Thermal Plastics [49:67]

Base material	Important plastics design for	Additives											
		PE	PVC	PS	PC	PP	PA	POM	SAN	ABS	PBTP	PETP	PMMA

PE	1	4	4	4	1	4	4	4	4	4	4	4
PVC	4	1	4	4	4	4	4	1	2	4	4	1
PS	4	4	1	4	4	4	4	4	4	4	4	4
PC	4	3	4	1	4	4	4	1	1	1	1	1
PP	3	4	4	4	1	4	4	4	4	4	4	4
PA	4	4	3	4	4	1	4	4	4	3	3	4
POM	4	4	4	4	4	4	1	4	4	3	4	4
SAN	4	1	4	1	4	4	4	1	1	4	4	1
ABS	4	2	4	1	4	4	3	4	1	3	3	1
PBTP	4	4	4	1	4	3	4	4	3	1	4	4
PETP	4	4	3	1	4	3	4	4	3	4	1	4
PMMA	4	1	3	1	4	4	3	1	1	4	4	1

1: Suitable

2: Suitable in restricted use

3: Suitable if used in small amounts

4: Not suitable

Attachment 4 4-1-2.(20) Amines that should not be degenerated during the decomposition of azo compounds

	Substances	CAS No.
1	4-aminobiphenyl	92-67-1
2	Benzedrine	92-87-5
3	4-chloro- <i>o</i> -toluidine	95-69-2
4	2-naphthylamine	91-59-8
5	<i>o</i> -aminoazotoluene	97-56-3
6	2-amino-4-nitrotoluene	99-55-8
7	<i>p</i> -chloroaniline	106-47-8
8	2,4-diaminoanisole	615-05-4
9	4,4'-diaminodiphenylmethane	101-77-9
10	3,3'-dichlorbenzidine	91-94-1
11	3,3'-dimethoxybenzidine	119-90-4
12	3,3'-dimethylbenzidine	119-93-7
13	4,4'-diamino-3,3'-dimethyldiphenylmethane	838-88-0
14	<i>p</i> -cresidine	120-71-8
15	4,4'-Methylene-bis - (2-Chloroaniline)	101-14-4
16	4,4'-oxydianiline	101-80-4
17	4,4'-4-Aminophenyl Sulfide Bis	139-65-1
18	<i>o</i> -toluidine	95-53-4
19	2,4-diaminotoluene	95-80-7
20	2,4,5-trimethylaniline	137-17-7
21	<i>o</i> -anisidine	90-04-0
22	4-amino- azo- benzene	60-90-3