

COSHH REGULATIONS 1997

Energizer and Eveready Batteries are designed and manufactured, so far as is reasonably practicable, so as to be safe and without risk to health when properly used.

Supplied as sealed units they represent no chemical hazard in the sense of the Control of Substances Hazardous to Health (COSHH) Regulations.

Chemical hazard can however arise if batteries are misused or abused when leakage or, in extreme cases, fire or explosion may occur.

In order to avoid potential problems the Battery Safety Guidelines (copy attached) should be observed on storage, use and disposal.

Detailed Chemical Hazard information for each battery type is attached (Tables 1-7). The following is a summary of the more likely hazards in practice.

1. ZINC CARBON BATTERIES (Eveready Super Heavy Duty Range)

The main chemical hazard arises if the battery leaks or vents. The electrolyte is a concentrated solution of zinc chloride and ammonium chloride in water. The material is acidic, corrosive and will cause burns to skin. The electrolyte is also harmful if it enters the eyes. If the user comes into contact with the electrolyte then the part affected should be washed immediately with water. If the material enters the eye medical attention should be sought without delay.

The Cathode mix is corrosive and contains manganese dioxide which is toxic if ingested. Medical attention should be sought if ingestion is thought to have arisen.

2. ZINC CHLORIDE BATTERIES (Eveready Silver)

The main chemical hazard arises if the battery leaks or vents. The electrolyte is a concentrated solution of zinc chloride in water. This material is acidic, corrosive and will cause burns to skin. The electrolyte is also harmful if it enters the eyes. If the user comes into contact with zinc chloride then the part affected should be washed immediately with water. If the material enters the eye medical attention should be sought without delay.

The cathode mix is corrosive and contains manganese dioxide which is toxic if ingested. Medical attention should be sought if ingestion is thought to have arisen.

3. **ALKALINE MANGANESE BATTERIES (Energizer Ultra + Range)**

The main hazard arises if the battery leaks or vents. The electrolyte is strongly alkaline 34-38% potassium hydroxide which is highly corrosive. It will cause burns to skin externally (or internally). Potassium hydroxide is exceedingly harmful if allowed to enter the eyes. Anyone coming into contact with potassium hydroxide should wash with copious amounts of water. Tissue damage is not usually apparent until several hours after exposure. If the material enters the eyes emergency hospital treatment should be sought without delay.

Alkaline manganese cells contain zinc powder and manganese dioxide. Both these substances are toxic by ingestion.

4. **BUTTON CELLS**

Any type of button cell is hazardous if swallowed. If this arises immediate medical attention should be sought. Surgical removal of the battery may be necessary.

The chemical hazard depends on the system type. If button cells are ingested even the nickel plated case material will dissolve in the stomach acid giving rise to toxic nickel salts. Most button cells contain 34-40% potassium hydroxide solution which is highly corrosive but present in small volume.

Mercuric oxide-zinc button cells are the most hazardous if ingested because they contain approximately 30% by cell weight of highly toxic mercuric oxide powder in the cathode. Other button cells also contain amalgamated zinc powder which may be harmful if ingested.

5. **NICKEL-CADMIUM BATTERIES**

These batteries contain 30% potassium hydroxide solution which is highly corrosive. Normally this material would only be expelled under overcharge conditions. These batteries also contain cadmium, cadmium hydroxide and nickel hydroxide all of which are toxic. If the user comes into contact with potassium hydroxide then the effected area should be washed with a copious supply of water. Potassium hydroxide is harmful if it enters the eyes.

**Table 1. Components of Eveready Super Heavy Duty Leclanche Batteries
(round and layer cell)
which could be exposed if cells leaked or disrupted on abuse.**

SUBSTANCE	HAZARD LEVEL	TYPE OF HAZARD
Zinc Can (Anode)	Low	Low Health risk could be a reactive fire hazard.
Cadmium (in Can)	Low	High toxicity but present at trace level.
Lead	Low	High toxicity present at low concentration.
Manganese dioxide (Cathode)	High	Toxic material present in large quantity. Irritant oxidising agent (assists fire). Avoid ingestion.
Ammonium chloride (electrolyte)	High	Corrosive, harmful if ingested. Avoid eye/skin contact.
Zinc chloride (electrolyte)	High	Corrosive, harmful if ingested. Avoid eye/skin contact.
Methyl cellulose coated paper separator	Low	Low hazard but would contain corrosive electrolyte components and traces of manganese dioxide.
Carbon rods (RC) Carbon coat on zinc (LC)	Low	Low hazard, but would be wet with corrosive electrolyte and is in contact with manganese dioxide.
Carbon Black (also Graphite in layer cells)	Low	Low oral toxicity, but is mixed with harmful manganese dioxide and corrosive electrolyte components.
Bitumen Sealant (RC) or Wax (LC)	Low	Low hazard, but material is in contact with other hazardous materials.
Shrink sleeve (LC)	Low	May contain cadmium oxide low ingestion hazard (danger on incineration).
Outer Labels / Metal Jackets	Low	Inks may be harmful if ingested in some cases.
Plated metal components	Low	Nickel or copper surfaces when corroded lead to the formation of toxic metal salts. Avoid ingestion.
Chloride (not a primary constituent)	Low	Toxic gas, but only formed if batteries charged or reverse positioned.
Nitrogen trichloride (not a primary constituent)	Low	Explosive compound which can be formed in rare instances during battery reversal or charging.

NOTE RC = Round Cell (R20, R14, R6 etc)
LC = Layer Cell (PP3, PP9, PP8 etc)

Table 2. Components of Eveready Silver Zinc Chloride batteries which could be exposed if cells leaked or disrupted on abuse.

SUBSTANCE	HAZARD LEVEL	TYPE OF HAZARD
Zinc Can (Anode)	Low	Low Health risk could be a reactive fire hazard.
Lead (in can)	Low	High toxicity present at low concentration.
Manganese Dioxide (Cathode)	High	Toxic material present in large quantity. Irritant, oxidising agent (assists fire). Avoid ingestion.
Zinc Chloride (Electrolyte)	High	Corrosive, harmful if ingested avoid eye/skin contact.
Separator, Starch PVA organic corrosion inhibitor	Low	Low hazard, but would contain corrosive electrolyte components and traces of manganese dioxide.
Carbon Rods (RC) or carbon coat on zinc (LC)	Low	Low hazard, but would be wet with corrosive electrolyte and is in contact with manganese dioxide.
Carbon Black	Low	Low oral toxicity but is mixed with harmful manganese dioxide and corrosive electrolyte components.
Bitumen Sealant (RC) or Wax Sealant (LC)	Low	Low hazard, but material is in contact with other hazardous materials.
Shrink sleeve	Low	May contain cadmium oxide, low ingestion hazard (danger on incineration).
Outer Labels/Metal Jackets	Low	Inks may be harmful if ingested in some cases.
Plated metal components	Low	Nickel or copper surfaces when corroded lead to the formation of toxic metal salts. Avoid ingestion.
Chlorine (not a primary constituent)	Low	Toxic gas, but only formed if batteries charged or reverse positioned.

Table 3. Components of Energizer Ultra + and Alkaline Manganese range which could be exposed if cells leaked or disrupted on abuse.

SUBSTANCE	HAZARD LEVEL	TYPE OF HAZARD
Zinc powder (Anode)	Low	Harmful by ingestion. Fire hazard when wet with electrolyte and exposed to air.
Carbopel Gellant	Low	Low oral toxicity but is in contact with anode and corrosive electrolyte.
Potassium Hydroxide Solution (electrolyte)	High	Highly corrosive, avoid skin contact. Dangerous if enters eyes.
Manganese dioxide (Cathode)	High	Toxic material present in largest quantity. Irritant oxidising agent (assists fire). Avoid ingestion.
Graphite	Low	Low toxicity but is mixed with harmful manganese dioxide.
Separator nylon/cellophane laminate	Low	Low toxicity but wet with corrosive potassium hydroxide.
Nickel plated steel container/top cap	Low	Corroded surfaces would lead to toxic nickel salts avoid contact.
Brass current collector mail	Low	Low inherent hazard.

Table 4a. Components of Zinc-Silver Oxide Button Cells which could be exposed if cells leaked or disrupted on abuse (* or through ingestion).

SUBSTANCE	HAZARD LEVEL	TYPE OF HAZARD
Amalgamated zinc powder (Anode)	High	Harmful mercury vapour released harmful by ingestion. Slight fire risk.
Silver Oxide (Cathode)	High	Silver salts are toxic if absorbed.
Graphite	Low	Low toxicity only harmful due to being mixed with silver oxide.
Potassium Hydroxide (electrolyte)	High	Highly corrosive, avoid skin and eye contact.
Nickel plated steel container	High *	Because of small size button cells easily swallowed by infants. Container will dissolve in stomach acid releasing toxic metal components.
Separator Permion / cellophane layer	Low	Low hazard, but contains corrosive electrolyte.

Table 4b. Components of Manganese Dioxide Button Cells which could be exposed if cells leaked or disrupted on abuse (* or through ingestion).

SUBSTANCE	HAZARD LEVEL	TYPE OF HAZARD
Amalgamated zinc powder (Anode)	High	Harmful mercury vapour released. Harmful by ingestion. Slight fire risk.
Manganese dioxide	High	Toxic material. Irritant oxidising agent (assists fire). Avoid ingestion.
Graphite	Low	Low toxicity only harmful due to being mixed with manganese dioxide.
Potassium Hydroxide (electrolyte)	High	Highly corrosive, avoid skin and eye contact.
Nickel plated steel container	High *	Because of small size button cells easily swallowed by infants. Container will dissolve in stomach acid releasing toxic metal components.
Separator Permion / cellophane layer	Low	Low hazard, but contains corrosive electrolyte.

Table 6. Components of Zinc-Air Button Cells which could be exposed if cells leaked or disrupted on abuse (* or through ingestion).

SUBSTANCE	HAZARD LEVEL	TYPE OF HAZARD
Amalgamated zinc powder (Anode)	High	Harmful mercury vapour released. Harmful by ingestion. Slight fire risk.
Air Cathode - mainly active carbon manganese dioxide and teflon binder on nickel mesh	Low	Small hazard, avoid ingestion.
Celgard and teflon separators	Low	Low hazard.
Potassium hydroxide (electrolyte)	High *	Highly corrosive avoid skin and eye contact.
Nickel plated steel container	High	Because of small size, button cells easily swallowed by infants. Container will dissolve in stomach acid releasing toxic metal components.

Table 7. Components of Rechargeable Nickel Cadmium Batteries which could be exposed if cells leaked or disrupted on abuse.

SUBSTANCE	HAZARD LEVEL	TYPE OF HAZARD
<u>Negative Electrode</u> Cadmium metal, cadmium hydroxide, nickel plated steel support strip	High	Cadmium metal and hydroxide present in large quantity. Highly toxic. Fire risk if exposed to air when charged. Cadmium vapour is then an additional hazard.
<u>Positive Electrode</u> Nickel Hydroxide, cobalt hydroxide, nickel plated steel support & nickel sinter	High	Nickel and cobalt hydroxide toxic if ingested.
Potassium Hydroxide (electrolyte)	High	Highly corrosive, avoid eye and skin contact.
Separator (Polyamide)	Low	Low inherent hazard but wet with electrolyte and in contact with electrodes.