Material Safety Data Sheet

Nickel Foam for Battery Cathode Substrate

Product Information

INCO Nickel Foam

MTI Corporation

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WHMIS Classification: Class D2B

Hazardous Ingredients

Hazardous Ingredients	Calculated Composition	C.A.S. No	Oral LD50 -rat	TLV1,2 –mg/m3
Nickel (Ni)*	99.9	7440-02-0	>9000 mg/kg	1.5*

Physical Data

Thin sheets of grey metallic, porous foam.

Ingredient	Mol. Wt.	Specific Gravity	m.p.°C	b.p.°C	Sol. In H20 g/100ml
Ni	58.71	8.9	1453	2732	0

Fire or Explosion Hazard

Not applicable.

Reactivity Data

Like other metals, nickel can react with acids to liberate hydrogen gas which can form explosive mixtures in air.

Finely-divided nickel metal may react explosively or incandescently with substances such as ammonium nitrate, perchlorates, phosphorous, etc.

Under special conditions nickel can react with carbon monoxide in reducing atmospheres to form nickel carbonyl, $Ni(CO)_4$, a toxic gas.

Toxicological Properties[3]

Nickel

Acute Toxicity:

a) Oral: Non toxic - LD_{50} ORAL RAT >9000 mg/kg

b) Inhalation:	One case has been reported of a fatality following extreme exposure at an estimated 382 mg Ni/m3. A plasma spraying operative died of pneumonia 13 days after exposure to nickel powder particles. The post mortem diagnosis was shock lung.
c) Dermal:	No information available.

Corrosivity/Irritation:

a) Respiratory Tract:	None
b) Skin:	See sensitization section.
c) Eyes:	Mechanical irritation may be expected.

Sensitization:

a) Respiratory tract:	Nickel metal induced asthma is very rare. 3 case reports are available; the data is not sufficient to conclude that nickel metal is classified as a respiratory sensitizer.
b) Skin:	Nickel metal is a well-known skin sensitizer. Direct and prolonged skin contact with metallic nickel may induce nickel allergy and elicit nickel allergic skin reactions in those people already sensitized to nickel, so called nickel allergic contact dermatitis.
c) Preexisting conditions:	Individuals known to be allergic to nickel should avoid contact with nickel whenever possible to reduce the likelihood of nickel allergic contact dermatitis reactions (skin rashes). Repeated contact may result in persistent chronic palmar/hand dermatitis in a smaller number of individuals, despite efforts to reduce or avoid nickel exposure.

Repeated dose toxicity:

a) Oral:	No information available
b) Inhalation:	Animal studies (rats) show that repeated dose inhalation of nickel damages the lung. Chronic inflammation, lung fibrosis and accumulation of nickel particles were observed.
c) Dermal:	Direct and prolonged skin contact with nickel metal may cause nickel sensitization resulting in nickel allergic contact dermatitis /skin rash.

Mutagenicity / Reproductive toxicity:	No data.

Carcinogencity:

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a) Ingestion: The U.S. National Institute for Occupational Safety and Health (NIOSH) concluded that there is no evidence that nickel metal is carcinogenic when ingested.

b) Inhalation: There is limited information available from inhalation and intratracheal studies in animals. The U.S. National Toxicology Program has listed metallic nickel as reasonably anticipated to be a human carcinogen. To date, there is no evidence that nickel metal causes cancer in humans based on epidemiology data from workers in the nickel producing and nickel consuming industries.

The International Agency for Research on Cancer (IARC)(Vol 49) found there was inadequate evidence that metallic nickel is carcinogenic to humans but since there was sufficient evidence that it is carcinogenic to animals, IARC concluded that metallic nickel is possibly carcinogenic to humans (Group 2B). In 1997, the ACGIH categorized elemental nickel as: A5 "Not Suspected as a Human Carcinogen". Epidemiological studies of workers exposed to nickel powder and to dust and fume generated in the production of nickel alloys and of stainless steel have not indicated the presence of a significant respiratory cancer hazard

Preventative Measures

If nickel dust accumulates where nickel foam is handled, collect it by sweeping or by vacuuming with the vacuum exhaust passing through a high efficiency particulate arresting (HEPA) filter if the exhaust is discharged into the workplace. Wear appropriate NIOSH-approved respirators selected according to the current edition of “The Selection, Care and Use of Respirators” CSA Z94.4 if collection and disposal of dust is likely to cause the concentration of airborne contaminants to exceed the exposure limits.

Avoid repeated skin contact. Wear suitable gloves. Wash skin thoroughly after handling. Launder clothing and gloves as needed.

Do not store near acids. Nickel-containing waste is normally collected to recover nickel values. Should waste disposal be deemed necessary, follow the relevant governmental regulations.

First Aid Measures

If exposure to nickel carbonyl is suspected, seek medical attention immediately. For skin rashes, seek medical attention. Cleanse wounds thoroughly to remove any particles.

Preparation Information

Prepared by:

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