



MATERIAL SAFETY DATA SHEET

Carbon Paste for Perovskite Solar Cell

SECTION 1: Identification of the substance / mixture and of the company / undertaking

1.1 Product Identifiers

Product name : Carbon Paste for Perovskite Solar Cell
 Brand : DM-CAP-4701
 Product codes : Research Batch _ This MSDS is for product trials only
 REACH No. : Not available. Annual tonnage does not require a registration.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Scientific research and development, professional use only. Screen Printing Paste

1.3 Details of the supplier of the safety data sheet

Company : Dycotec Materials Ltd
 Unit 12 Star West,
 Westmead Drive, Westlea,
 Swindon, Wiltshire SN5 7SW, UK
 Telephone : +44 (0) 1788 814025
 E-mail address : info@dycotecmaterials.com

1.4 Emergency telephone number

Emergency Phone No. : +44 (0) 7495 248908 Only available during office hours

SECTION 2: Hazards Identification

2.1 Classification of the substance or mixture

Physical hazards :
 Health hazards : H302; H315; H319
 Environmental hazards : H410
 Physicochemical : Stable. Solidify/Cured by thermal process. Fully cured product residues are generally not regarded as hazardous waste

2.2 Label elements

Pictogram



Signal word : Warning
 Hazard statements :
 H302 – Harmful if swallowed
 H315 – Causes skin irritation
 H319 – Causes serious eye irritation
 H410 – Very toxic to aquatic life with long lasting effects

Precautionary statements :

P264 – Wash hand thoroughly after handling.
 P270 – Do not eat, drink or smoke when using this product.
 P301+P312 – IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
 P330 – Rinse mouth
 P501 – Dispose of contents/container in accordance with local/regional/national/international regulations
 P280 – Wear protective gloves/protective clothing/eye protection/face protection.
 P302 + P352 – IF ON SKIN: Wash with plenty of soap and water.
 P333 + P313 – If skin irritation or rash occurs: Get medical advice/attention.
 P362 – Take off contaminated clothing and wash before reuse.

P261 – Avoid breathing dust/fumes/gas/mist/vapours/spray.
 P272 – Contaminated work clothing should not be allowed out of the workplace.
 P305+P351+P338 – IF IN EYES: Rinse cautiously with water for several minutes.
 Remove contact lenses, if present and easy to do. Continue rinsing.
 P337+P313 – If eye irritation persists: Get medical advice / attention

P273 – Avoid release to the environment
P391 – Collect spillage

2.3 Other hazards

No data available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**3.2 Mixtures**

Blended Adhesion Resin; Synonyms:		< 20%
CAS #:	EC #:	
Classification		
Aromatic Solvent System; Synonyms:		Bal.
CAS #:	EC #:	
Classification	H302, H315, H319, H410	
Blended Carbon Mixture; Synonyms:		< 50%
CAS #:	EC #:	
Classification		

The full text for all Hazard Statements are displayed in Section 16.

SECTION 4: FIRST AID MEASURES**4.1 Description of first aid measures****General information**

Remove affected person from source of contamination. Remove contaminated clothing. First aid personnel must be aware of own risk during rescue. Consult a physician. Show this safety data sheet to the doctor in attendance.

Inhalation

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

Ingestion

Never give anything by mouth to an unconscious person. Rinse mouth with plenty of water. Consult a physician

Skin contact

Wash off with soap and plenty of water. Consult a physician

Eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and or in section 11.

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: FIRE-FIGHTING MEASURES**5.1 Extinguishing media**

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Carbon dioxide

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary

5.4 Further information

Use water spray to cool unopened containers.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Wipe up with inert absorbent material and disposal of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters – Components with workplace control parameters

No occupational exposure limits known.

8.2 Exposure Controls**Protective equipment****Appropriate engineering controls**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Eye/face protection

Use approved safety glasses with side shields. Eyewear complying with an approved standard should be worn if a risk assessment indicate eye contact is possible. The following protection should be worn: Chemical splash goggles or face shield.

Hand protection

Handle with gloves. Gloves must be inspected prior to use. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it. Wear protective gloves made of the following material: Nitrile rubber. The most suitable glove should be chosen in consultation with the glove supplier/manufacturer, who can provide information about the breakthrough time of the glove material. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Other skin and body protection

Wear appropriate clothing to prevent any possibility of liquid contact and repeated or prolonged vapour contact

Hygiene measures

Do not smoke in work area. Wash hands thoroughly after handling. Promptly remove any clothing that becomes contaminated. When using do not eat, drink or smoke. Contaminated clothing should be placed in a closed container for disposal of decontamination. Warn cleaning personnel of any hazardous properties of the product.

Respiratory protection

If ventilation is inadequate, suitable respiratory protection must be worn. Wear a respirator fitted with the following cartridge: Combination filter, type A2/P3. In confined or poorly ventilated spaces, a supplied air respirator must be worn.

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Paste
Colour	Black
Odour	No data available
Odour Threshold	No data available
pH	No data available
Melting / freezing point	No data available
Initial boiling point and boiling range	No data available
Flash point	No data available
Evaporation rate	No data available
Flammability (solid, gas)	No data available
Upper/lower flammability or explosive limits	No data available
Vapour pressure	No data available
Vapour density	No data available
Relative density	No data available
Water solubility	No data available
Partition coefficient	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	See Batch Specification
Explosive properties	No data available
Oxidizing properties	No data available

9.1 Other information

No data available

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions. Stable at normal ambient temperatures.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

See section 7 – Handling and storage

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Does not decompose when used and stored as recommended.

Other decomposition products - no data available

In the event of fire - see section 5

SECTION 11: TOXICOLOGICAL INFORMATION

Acute toxicity:

LD50 Dermal - Rabbit - > 7,940 mg/kg

Remarks: Behavioral:Somnolence (general depressed activity). Behavioral:Food intake (animal).

This product has not been tested. The statement has been derived from the properties of the individual components.

Skin corrosion/irritation:

Skin - Rabbit

Result: Severe skin irritation - 24 h

(Draize Test) This product has not been tested. The statement has been derived from the properties of the individual components.

Serious eye damage/eye irritation:

No data available

Respiratory or skin sensitization:

No data available

Germ cell mutagenicity:

The substance was not mutagenic in bacteria. The substance was mutagenic in various cell culture test systems; however, these results could not be confirmed in test with mammals. The product has not been tested. The statement has been derived from the properties of the individual components.

Carcinogenicity: No data available**Reproductive toxicity:** No data available

Specific target organ toxicity – single exposure:

No data available.

Specific target organ toxicity – repeated exposure:

No data available.

Aspiration hazard: No data available**Signs and Symptoms of Exposure:** No data available**Additional Information:** No data available.

To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

SECTION 12: ECOLOGICAL INFORMATION**Ecotoxicity**

Do not empty into drains, soil or bodies of water. Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates

This product has not been tested. The statement has been derived from the properties of the individual components.

12.2 Persistence and degradability

no data available

12.3 Bioaccumulative potential

no data available

12.4 Mobility in soil

no data available

12.5 Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

This product has not been tested. The statement has been derived from the properties of the individual components.

12.6 Other adverse effects

Very toxic to aquatic life with long lasting effects.

SECTION 13: DISPOSAL CONSIDERATIONS**13.1 Waste treatment methods****General Information**

When handling waste, the safety precautions applying to handling of the product should be considered. Do not dump into any sewers, on the ground, or into any body of water. Not to be disposed of together with household waste. Any disposal practice must be in compliance with all local and national laws and regulations. Handle and dispose contaminated packages in the same way as the product itself. Fully cured product residues are generally not regarded as hazardous waste.

Disposal methods

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging

Dispose of as unused product.

SECTION 14: TRANSPORT INFORMATION**14.1 UN number**

ADR/RID	IMDG	IATA
UN3082	UN3082	UN3082

14.2 UN proper shipping name

ADR/RID	IMDG	IATA
Environmentally Hazardous Substance, Liquid, N.O.S.		

14.3 Transport hazard class(es)

ADR/RID	IMDG	IATA
9, EHSM		

14.4 Packaging group

ADR/RID	IMDG	IATA
III		

14.5 Environmental hazards

ADR/RID	IMDG Marine pollutant	IATA
yes	yes	yes

14.6 Special precautions for user

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

SECTION 15: REGULATORY INFORMATION

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

no data available

15.2 Chemical Safety Assessment

no data available

SECTION 16: OTHER INFORMATION**General Information**

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is finished without warranty and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

This is an experimental product. This safety data sheet is for product trials only!

Hazard statements in full

H302 – Harmful if swallowed Acute Tox. 4

H315 – Causes skin irritation Skin Irrit. 2

H319 – Causes serious eye irritation Eye Irrit. 2

H410 – Very toxic to aquatic life with long lasting effects Aquatic Acute 1; Aquatic Chronic 1