

NMSP Worksheet - Physical and Chemical Properties

Instructions: You are not required to complete this worksheet. It is an optional summary presentation of the data you are submitting, and is intended to assist in the review of the physical and chemical properties data. This worksheet is also intended to help in the understanding of the types of characterization data typically available for engineered nanoscale materials. If data is not provided, please help us understand why it wasn't provided.

Please complete the following worksheet by identifying the property measured; the value of the property; the units in which the property is measured or estimated (as necessary); whether it is a measured or estimated value; the name of the method used to obtain the data; the page on which the data is provided, or if not provided, an indication of why it wasn't provided; and, whether or not the value is claimed as confidential. If non-standard methods were used in the collection of data, EPA would also be interested in receiving a brief description of the alternate method.

The physical state of the neat substance should be measured for the neat (100% pure) chemical substance. Properties that are measured for mixtures or formulations should be so noted (i.e., % substance in ____). In addition, please provide any nanoscale material specific chemical and physical characterization data.

Property	Value	Measured or Estimated (M or E)	Method Used	Provided on page	If not provided, why not? Mark (X) all that apply:	Mark (X) for Confidential
			Provide the Name of the method used. Mark (X) in the box if a nonstandard method was used and attach a description of the non-standard method.		1-Not Applicable 2-No Known Method 3-Method requires too much test material 4-Method is too expensive 5-Other (explain)	
Part 1 - General Physical and Chemical Properties						
Physical state of neat substance	<input type="checkbox"/> Solid <input type="checkbox"/> Gas <input type="checkbox"/> Liquid	<input type="text"/>	<input type="text"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Vapor pressure @ Temperature <input type="text"/> °C	Torr: <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Density/relative Density	g/cm ³ : <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Pour Density	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Solubility in Water @ Temperature <input type="text"/> °C	g/L: <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Solubility in Water @ Temperature <input type="text"/> °C Solvent: <input type="text"/>	g/L: <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>

NMSP Worksheet - Physical and Chemical Properties (Continued)

Property	Value	Measured or Estimated (M or E)	Method Used	Provided on page	If not provided, why not? Mark (X) all that apply:	Mark (X) for Confidential
			Provide the Name of the method used. Mark (X) in the box if a nonstandard method was used and attach a description of the non-standard method.		1-Not Applicable 2-No Known Method 3-Method requires too much test material 4-Method is too expensive 5-Other (explain)	
Part 1 - General Physical and Chemical Properties (Continued)						
Melting Temperature	<input type="text"/> °C	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Boiling / Sublimation Temperature @ <input type="text"/> torr pressure	<input type="text"/> °C	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Spectra	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Tunneling Electron Microscope Images	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Dissociation Constant	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Octanol / Water Partition Coefficient	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Henry's Law Constant	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Volatillization from Water	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Volatillization from Soil	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>

NMSP Worksheet - Physical and Chemical Properties (Continued)

Property	Value	Measured or Estimated (M or E)	Method Used	Provided on page	If not provided, why not? Mark (X) all that apply:	Mark (X) for Confidential
			Provide the Name of the method used. Mark (X) in the box if a nonstandard method was used and attach a description of the non-standard method.		1-Not Applicable 2-No Known Method 3-Method requires too much test material 4-Method is too expensive 5-Other (explain)	

Part 1 - General Physical and Chemical Properties (Continued)

pH @ Concentration: <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Flammability	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Explosibility	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Adsorption / Coefficient	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>

Part 2 - Specific Physical and Chemical Properties

General Characteristics

Crystal Structure	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Agglomeration State	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>

Particle Characteristics

Particle Size Distribution	Please provide a graph with percentage of particles in each diameter class. For elongated particles, provide a length distribution graph showing the percentage of particles in each length class	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
----------------------------	---	----------------------	---	----------------------	---	--------------------------

NMSP Worksheet - Physical and Chemical Properties (Continued)

Property	Value	Measured or Estimated (M or E)	Method Used	Provided on page	If not provided, why not? Mark (X) all that apply:	Mark (X) for Confidential
			Provide the Name of the method used. Mark (X) in the box if a nonstandard method was used and attach a description of the non-standard method.		1-Not Applicable 2-No Known Method 3-Method requires too much test material 4-Method is too expensive 5-Other (explain)	
Part 2 - Specific Physical and Chemical Properties (Continued)						
Particle Characteristics (Continued)						
Mean Particle Size (diameter and/or length)	<input type="text"/> nm	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Standard Deviation from Mean	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Largest Particle Size (diameter and/or length)	<input type="text"/> nm	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Smallest Particle Size (diameter and/or length)	<input type="text"/> nm	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Aspect Ratio	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Average Aerodynamic Diameter	<input type="text"/> nm	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Average Particle Mass	<input type="text"/> g	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Particle Shape	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>

NMSP Worksheet - Physical and Chemical Properties (Continued)

Property	Value	Measured or Estimated (M or E)	Method Used	Provided on page	If not provided, why not? Mark (X) all that apply:	Mark (X) for Confidential
			Provide the Name of the method used. Mark (X) in the box if a nonstandard method was used and attach a description of the non-standard method.		1-Not Applicable 2-No Known Method 3-Method requires too much test material 4-Method is too expensive 5-Other (explain)	

Part 2 - Specific Physical and Chemical Properties (Continued)

Surface Characteristics

Surface Area	m ² /g: <input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Average Particle Surface Area	m ² : <input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Surface Charge (Zeta Potential)	mV: <input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Porosity	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Surface Chemical Composition	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Surface / Volume Ratio	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>

Fate and Transport Characteristics

Diffusion Rate	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Gravitational Setting Rate	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>

NMSP Worksheet - Physical and Chemical Properties (Continued)

Property	Value	Measured or Estimated (M or E)	Method Used	Provided on page	If not provided, why not? Mark (X) all that apply:	Mark (X) for Confidential
			Provide the Name of the method used. Mark (X) in the box if a nonstandard method was used and attach a description of the non-standard method.		1-Not Applicable 2-No Known Method 3-Method requires too much test material 4-Method is too expensive 5-Other (explain)	

Part 2 - Specific Physical and Chemical Properties (Continued)

Fate and Transport Characteristics (Continued)

Sorption Rate	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Deposition Rate	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Wet and Dry Transport	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Biodegradation Rate	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Bioaccumulation	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Biotransportation	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
Influence of Redox / Photochemical Reaction	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>

Other (Please specify other items)

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> <input type="checkbox"/>	<input type="text"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/> <input type="text"/>	<input type="checkbox"/>
----------------------	----------------------	----------------------	---	----------------------	---	--------------------------

NMSP Worksheet - Physical and Chemical Properties (Continued)

Property	Value	Measured or Estimated (M or E)	Method Used	Provided on page	If not provided, why not? Mark (X) all that apply:	Mark (X) for Confidential
			Provide the Name of the method used. Mark (X) in the box if a nonstandard method was used and attach a description of the non-standard method.		1-Not Applicable 2-No Known Method 3-Method requires too much test material 4-Method is too expensive 5-Other (explain)	

Part 2 - Specific Physical and Chemical Properties (Continued)

Other (Please specify other items)

		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. <input type="checkbox"/> 2. <input type="checkbox"/> 3. <input type="checkbox"/> 4. <input type="checkbox"/> 5. <input type="checkbox"/>	<input type="checkbox"/>

Additional Information:	
-------------------------	--

Mark (X) if you attached anything to this Worksheet.

See PRA Notice on page 1 of the NMSP Optional Form.