Meta-Agent Routing Validation Results

# Query: How do I handle hypophosphorous acid?

Combined Answer: To handle hypophosphorous acid, follow these steps:  
1. Place Cane A in its designated position.  
2. Close manual valve 1.  
3. Close the acid container.  
4. If the hypophosphorous acid container is empty, place it in the exit area.  
5. Retrieve a new container from the entry area and place it on the scale.  
6. Collect empty containers and ensure a spare container is available in the entry area.  
Confidence: 95%

Confidence: 95%

Evaluation Feedback:

Work Result: {'answer': 'To handle hypophosphorous acid, follow these steps:\n1. Place Cane A in its designated position.\n2. Close manual valve 1.\n3. Close the acid container.\n4. If the hypophosphorous acid container is empty, place it in the exit area.\n5. Retrieve a new container from the entry area and place it on the scale.\n6. Collect empty containers and ensure a spare container is available in the entry area.\nConfidence: 95%', 'confidence': 95, 'source\_documents': [{'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250204224823+01'00'", 'modDate': "D:20250204224823+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Hypophosphorous Acid', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250204224823+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '2', 'Date': '20/06/2020', '\_id': '7d5df0fb-f864-4c39-b442-1b20e21fd56c', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250204224823+01'00'", 'modDate': "D:20250204224823+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Hypophosphorous Acid', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250204224823+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '2', 'Date': '20/06/2020', '\_id': '505a40bb-a88a-41ff-a84c-eeff023f922d', '\_collection\_name': 'work\_instructions\_RAG'}], 'refined': False}

## Retrieved Documents:

* • Work Instruction - Hypophosphorous Acid
* • Work Instruction - Hypophosphorous Acid

# Query: What safety measures are required for unloading a tanker?

Combined Answer: To ensure a safe unloading process, follow these steps:  
\* Verify the unloading order details, including the tank and product being unloaded.  
\* Complete tanker documentation before proceeding.  
\* Deliver a sample to the control laboratory for analysis with the report.  
\* Wait for quality approval (OK) before starting the unloading process.  
\* Use specific personal protective equipment (PPE): neoprene gloves and face shield for operators, based on the storage depot (SD) numbers.  
\* The driver should use a lifeline, harness, and safety guardrail when opening the bottom valve.  
\* Open steam passage valves to heat pipes prior to unloading.  
\* Request plant authorization before commencing operations.  
Confidence: 95%

Confidence: 95%

Evaluation Feedback:

Work Result: {'answer': 'To ensure a safe unloading process, follow these steps:\n\* Verify the unloading order details, including the tank and product being unloaded.\n\* Complete tanker documentation before proceeding.\n\* Deliver a sample to the control laboratory for analysis with the report.\n\* Wait for quality approval (OK) before starting the unloading process.\n\* Use specific personal protective equipment (PPE): neoprene gloves and face shield for operators, based on the storage depot (SD) numbers.\n\* The driver should use a lifeline, harness, and safety guardrail when opening the bottom valve.\n\* Open steam passage valves to heat pipes prior to unloading.\n\* Request plant authorization before commencing operations.\nConfidence: 95%', 'confidence': 95, 'source\_documents': [{'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250207084523+01'00'", 'modDate': "D:20250207084523+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250207084523+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '3', 'Date': '10/11/2020', '\_id': '20dd538f-9f76-448a-acc3-dac5145aa78f', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250207084523+01'00'", 'modDate': "D:20250207084523+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250207084523+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '3', 'Date': '10/11/2020', '\_id': 'f554abfb-5f6d-4a42-b12b-e9f53504abc8', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250207084523+01'00'", 'modDate': "D:20250207084523+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250207084523+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '3', 'Date': '10/11/2020', '\_id': 'd7acbabf-fdb7-432b-a037-d975f5a86d29', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250207084523+01'00'", 'modDate': "D:20250207084523+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250207084523+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '3', 'Date': '10/11/2020', '\_id': 'db9f6252-bfab-4f40-b68c-098df0ad9f70', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250207084523+01'00'", 'modDate': "D:20250207084523+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250207084523+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '3', 'Date': '10/11/2020', '\_id': '61e2a066-e698-40a5-8c9b-d4529d6b8948', '\_collection\_name': 'work\_instructions\_RAG'}], 'refined': False}

## Retrieved Documents:

* • Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1
* • Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1
* • Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1
* • Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1
* • Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1

# Query: What are the steps for HPLC Sulfated Analysis?

Combined Answer: \* The document titled "Work Instruction" (Document Code: ZF-IT-SUL-) provides guidance for Sulfated Analysis by HPLC.  
\* Key steps specified in the document are:  
+ Puncture the sample and insert it using a needle through an opened slot.  
+ Remove the needle and close the slot after sample insertion.  
+ Deliver the sample to the control laboratory along with the analysis report.  
+ Wait for confirmation of quality OK before starting any further processes.  
\* Confidence: 90%

Confidence: 90%

Evaluation Feedback:

Work Result: {'answer': '\* The document titled "Work Instruction" (Document Code: ZF-IT-SUL-) provides guidance for Sulfated Analysis by HPLC.\n\* Key steps specified in the document are:\n+ Puncture the sample and insert it using a needle through an opened slot.\n+ Remove the needle and close the slot after sample insertion.\n+ Deliver the sample to the control laboratory along with the analysis report.\n+ Wait for confirmation of quality OK before starting any further processes.\n\* Confidence: 90%', 'confidence': 90, 'source\_documents': [{'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250206231231+01'00'", 'modDate': "D:20250206231231+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Sulfated Analysis by HPLC', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250206231231+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '1', 'Date': '31/7/2020', '\_id': 'd3a04d83-4e10-4af9-8f63-1f7b7c42b5e8', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250207084523+01'00'", 'modDate': "D:20250207084523+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250207084523+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '3', 'Date': '10/11/2020', '\_id': '785f2044-c515-4cf3-b1d2-aa4ce5441a5e', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250206231231+01'00'", 'modDate': "D:20250206231231+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Sulfated Analysis by HPLC', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250206231231+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '1', 'Date': '31/7/2020', '\_id': '7d9e7145-c9b3-434b-af44-dfd9428957f7', '\_collection\_name': 'work\_instructions\_RAG'}], 'refined': False}

## Retrieved Documents:

* • Work Instruction - Sulfated Analysis by HPLC
* • Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1
* • Work Instruction - Sulfated Analysis by HPLC

# Query: How do I properly clean the reactor after use?

Combined Answer: To properly clean the reactor after use, follow these steps:  
\* Wear the specific PPE: neoprene gloves and a face shield for safety.  
\* Position of Equipment: place the portable hopper next to the reactor.  
\* Cleaning Process:  
+ Once hypophosphorous acid is loaded into R-001 and the desired amount is confirmed by weight difference on the scale:  
- Lift the cane to allow air to be drawn in until everything is clean.  
Confidence: 90%

Confidence: 90%

Evaluation Feedback:

Work Result: {'answer': 'To properly clean the reactor after use, follow these steps:\n\* Wear the specific PPE: neoprene gloves and a face shield for safety.\n\* Position of Equipment: place the portable hopper next to the reactor.\n\* Cleaning Process:\n+ Once hypophosphorous acid is loaded into R-001 and the desired amount is confirmed by weight difference on the scale:\n- Lift the cane to allow air to be drawn in until everything is clean.\nConfidence: 90%', 'confidence': 90, 'source\_documents': [{'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250206230521+01'00'", 'modDate': "D:20250206230521+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Manual Load Solids', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250206230521+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '2', 'Date': '14/11/2022', '\_id': '78eed182-caf6-469f-8a87-5fc347463091', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250207084523+01'00'", 'modDate': "D:20250207084523+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250207084523+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '3', 'Date': '10/11/2020', '\_id': '94edf76d-4919-4dab-939e-39556b447e33', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250206230521+01'00'", 'modDate': "D:20250206230521+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Manual Load Solids', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250206230521+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '2', 'Date': '14/11/2022', '\_id': 'bb7766b9-6199-475d-8748-5bdf771cac0e', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250204224823+01'00'", 'modDate': "D:20250204224823+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Hypophosphorous Acid', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250204224823+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '2', 'Date': '20/06/2020', '\_id': '70aa03d8-845a-459f-9600-6ad64ff976aa', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250206230521+01'00'", 'modDate': "D:20250206230521+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Manual Load Solids', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250206230521+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '2', 'Date': '14/11/2022', '\_id': 'c8f92ff2-9882-4087-8d0d-500775fafdba', '\_collection\_name': 'work\_instructions\_RAG'}], 'refined': False}

## Retrieved Documents:

* • Work Instruction - Manual Load Solids
* • Work Instruction - Tanker Unloading to SD-5, SD-6, SD-7, SD-8 and SD-12-1
* • Work Instruction - Manual Load Solids
* • Work Instruction - Hypophosphorous Acid
* • Work Instruction - Manual Load Solids

# Query: What is the required PPE for handling sulfuric acid?

Combined Answer: \* Neoprene gloves are required PPE for handling sulfuric acid.  
\* A face shield is also necessary when handling sulfuric acid.  
\* An apron is recommended to protect clothing from potential spills or splashes of sulfuric acid.  
Confidence: 95%.

Confidence: 95%

Evaluation Feedback:

Work Result: {'answer': '\* Neoprene gloves are required PPE for handling sulfuric acid.\n\* A face shield is also necessary when handling sulfuric acid.\n\* An apron is recommended to protect clothing from potential spills or splashes of sulfuric acid.\nConfidence: 95%.', 'confidence': 95, 'source\_documents': [{'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250204224823+01'00'", 'modDate': "D:20250204224823+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Hypophosphorous Acid', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250204224823+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '2', 'Date': '20/06/2020', '\_id': 'efb11f00-5bc8-446c-b128-ad6cd5c9b3ff', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250204224823+01'00'", 'modDate': "D:20250204224823+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Hypophosphorous Acid', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250204224823+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '2', 'Date': '20/06/2020', '\_id': '87356d35-0dc4-44a0-85d3-d2b0354edf83', '\_collection\_name': 'work\_instructions\_RAG'}, {'format': 'PDF 1.7', 'title': '', 'author': 'Ricard Torralba', 'subject': '', 'keywords': '', 'creator': 'Microsoft® Word for Microsoft 365', 'producer': 'Microsoft® Word for Microsoft 365', 'creationDate': "D:20250206231231+01'00'", 'modDate': "D:20250206231231+01'00'", 'trapped': '', 'encryption': None, 'Document Name': 'Work Instruction - Sulfated Analysis by HPLC', 'Step Number': None, 'Author': 'Ricard Torralba', 'Created Date': "D:20250206231231+01'00'", 'Keywords': [''], 'Process Type': None, 'Safety Measures': [], 'Version': '1', 'Date': '31/7/2020', '\_id': '7d9e7145-c9b3-434b-af44-dfd9428957f7', '\_collection\_name': 'work\_instructions\_RAG'}], 'refined': False}

## Retrieved Documents:

* • Work Instruction - Hypophosphorous Acid
* • Work Instruction - Hypophosphorous Acid
* • Work Instruction - Sulfated Analysis by HPLC