

SAFETY DATA SHEET

Residuum



Section 1. Identification

Product name : Residuum
Product code : Not available.
Synonyms : AC-10, AC-10000, AC-20, Asphalt, Coker Charge, Crude Reduced Crude, Crude TWR BTMS, Crude Vac Bottoms, Decant Oil, PDA Bottoms, PG 58-28, Pitch, RC-6000, Residuum, Slurry Reflux/Slurry Recycle, Vacuum Tower Bottoms (VTB)

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

Product use : Industrial: Intermediate.
Area of application : Industrial applications.

Manufacturer : HollyFrontier Refining & Marketing LLC
2828 North Harwood
Suite 1300
Dallas, Texas 75201
USA
Customer Service: (888) 286-8836

Emergency telephone number : CHEMTREC® (800) 424-9300
CCN 201319

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : H351 CARCINOGENICITY - Category 2

GHS label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : H351 - Suspected of causing cancer.

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing.

Response : IF exposed or concerned: Get medical attention.

Storage : Not applicable.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : May release hydrogen sulfide a poisonous gas that can accumulate in confined spaces.

Section 3. Composition/information on ingredients

Substance/mixture : Multi-constituent substance

CAS number/other identifiers

CAS number : Not available.

Ingredient name	Other names	%	CAS number
Asphalt	-	0 - 100	8052-42-4
Residues (petroleum), vacuum	-	0 - 100	64741-56-6
Residues (petroleum), hydrodesulfurized vacuum	-	0 - 100	64742-85-4
hydrogen sulfide	-	0.0001	7783-06-4

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention. Continue to rinse for at least 15 minutes.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 15 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Wash out mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Eye contact** : Slightly irritating to the eyes. Possible tearing, burning sensation and redness.
- Inhalation** : Mist/high concentrations: Inhalation may cause irritation to the nose, throat, upper respiratory tract and lungs.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : No known significant effects or critical hazards.

Over-exposure signs/symptoms

- Eye contact** : No specific data.
- Inhalation** : No specific data.
- Skin contact** : No specific data.
- Ingestion** : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of medical responders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : In a fire or if heated, a pressure increase will occur and the container may burst. May release hydrogen sulfide a poisonous gas that can accumulate in confined spaces.
- Hazardous thermal decomposition products** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment. May release hydrogen sulfide a poisonous gas that can accumulate in confined spaces.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, waterways, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container. High pressure skin injections are serious medical emergencies. Injury will not appear serious at first. Within a few hours, tissue will

become swollen, discolored and extremely painful. May release hydrogen sulfide a poisonous gas that can accumulate in confined spaces.

Advice on general occupational hygiene

- : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities

- : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Asphalt	<p>NIOSH REL (United States, 10/2016). CEIL: 5 mg/m³ 15 minutes. Form: Fume</p> <p>ACGIH TLV (United States, 3/2017). TWA: 0.5 mg/m³, (as benzene soluble aerosol) 8 hours. Form: Inhalable fraction</p>
Residues (petroleum), vacuum	None.
Residues (petroleum), hydrodesulfurized vacuum	None.
hydrogen sulfide	<p>ACGIH TLV (United States, 3/2017). TWA: 1 ppm 8 hours. STEL: 5 ppm 15 minutes.</p> <p>OSHA PEL Z2 (United States, 2/2013). CEIL: 20 ppm AMP: 50 ppm 10 minutes.</p> <p>NIOSH REL (United States, 10/2016). CEIL: 10 ppm 10 minutes. CEIL: 15 mg/m³ 10 minutes.</p>

Appropriate engineering controls

- : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. May release hydrogen sulfide a poisonous gas that can accumulate in confined spaces.

Environmental exposure controls

- : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures

- : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

- : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection

- : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid. [Viscous]
- Color** : Black./Dark brown.
- Odor** : Asphalt
- Odor threshold** : Not available.
- pH** : Not applicable.
- Melting point** : Not available.
- Boiling point** : 219 to 505°C (426 to 941°F)
- Flash point** : Closed cup: 158 to 275°C (316 to 527°F)
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not applicable.
- Lower and upper explosive (flammable) limits** : Not applicable.
- Vapor pressure** : Not available.
- Vapor density** : Not available.
- Specific gravity** : 0.916 to 1.07
- Density** : Not available.
- Solubility** : Insoluble in the following materials: cold water and hot water.
- Partition coefficient: n-octanol/water** : ≥4
- Auto-ignition temperature** : Not applicable.
- Decomposition temperature** : Not available.
- Viscosity** : Kinematic (40°C (104°F)): 0.2883 to 10.84 cm²/s (28.83 to 1084 cSt)
- Flow time (ISO 2431)** : Not available.

Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
Under normal conditions of storage and use, hazardous polymerization will not occur.
- Conditions to avoid** : No specific data.
- Incompatible materials** : Reactive or incompatible with the following materials: oxidizing materials
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Asphalt	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
Residues (petroleum), vacuum	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
Residues (petroleum), hydrodesulfurized vacuum	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-

Conclusion/Summary : Based on CONCAWE assessment of bitumen.

Irritation/Corrosion

Not available.

Conclusion/Summary

Skin : Based on CONCAWE assessment of bitumen. May cause slight transient irritation.

Eyes : Based on CONCAWE assessment of bitumen. May cause slight transient irritation.

Sensitization

Conclusion/Summary

Skin : Based on CONCAWE assessment of bitumen. Not sensitizing.

Respiratory : No data available.

Mutagenicity

Conclusion/Summary : Based on CONCAWE assessment of bitumen. No mutagenic effect.

Carcinogenicity

Product/ingredient name	OSHA	IARC	NTP
Asphalt	-	2B	-
Residues (petroleum), vacuum	-	2B	-

Reproductive toxicity

Conclusion/Summary : No data available.

Teratogenicity

Conclusion/Summary : No data available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Name	Result
Residuum	Not applicable.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Dermal, Inhalation.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Conclusion/Summary : Based on CONCAWE assessment of bitumen. No systemic toxicity.

General : No known significant effects or critical hazards.

Carcinogenicity : Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Conclusion/Summary : No data available.

Persistence and degradability

Conclusion/Summary : Based on CONCAWE assessment of bitumen.

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Asphalt	-	-	Not readily
Residues (petroleum), vacuum	-	-	Not readily
Residues (petroleum), hydrodesulfurized vacuum	-	-	Not readily

Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
Residuum	≥4	-	high
Asphalt	≥4	-	high
Residues (petroleum), vacuum	≥4	-	high
Residues (petroleum), hydrodesulfurized vacuum	≥4	-	high

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	No.	No.	No.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

U.S. Federal regulations : **United States inventory (TSCA 8b):** All components are listed or exempted.
Clean Water Act (CWA) 311: hydrogen sulfide

Clean Air Act Section 112 : Listed

(b) Hazardous Air Pollutants (HAPs)

SARA 302/304

Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
hydrogen sulfide	0.0001	Yes.	500	-	100	-

SARA 304 RQ : 100000000 lbs / 45400000 kg [12077956.9 gal / 45720040.3 L]

SARA 311/312

Classification : CARCINOGENICITY - Category 2

Composition/information on ingredients

Name	%	Classification
Asphalt	0 - 100	CARCINOGENICITY - Category 2
Residues (petroleum), vacuum	0 - 100	CARCINOGENICITY - Category 2

SARA 313

Not applicable.

State regulations

- Massachusetts** : The following components are listed: ASPHALT FUMES; ASPHALT (CUTBACK)
New York : None of the components are listed.
New Jersey : The following components are listed: ASPHALT; ASPHALT (TYPICAL)
Pennsylvania : The following components are listed: ASPHALT
California Prop. 65

⚠ WARNING: This product can expose you to Bitumens, extracts of steam-refined and air refined, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Ingredient name	No significant risk level	Maximum acceptable dosage level
Bitumens, extracts of steam-refined and air refined	-	-

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Section 16. Other information

National Fire Protection Association (U.S.A.)



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Procedure used to derive the classification

Classification	Justification
Carc. 2, H351	Calculation method

Date of issue/Date of revision : 12/14/2017

Date of previous issue : 05/30/2014

Version : 2

Key to abbreviations

: ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
UN = United Nations

✔ Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named manufacturer, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.