



# United States Steel Corporation

## CLEAN COKE OVEN GAS

### Safety Data Sheet (SDS)

USS IHS Number: IHS 82493

(Replaces USS Code Number IHS: 33, 24838, 52321, COK-0020)

Locations: Gary Works, Granite City Works, Hamilton Works, Lake Erie Works, Mon Valley Works, U. S. Steel Kosice

Original: 12/16/2010

Revision: 10/20/2020

### Section 1 – Identification

1(a) Product Identifier used on Label: Clean Coke Oven Gas

1(b) Other Means of Identification: Coke Oven Gas (COG), Sweet Coke Oven Gas

1(c) Recommended use of the chemical and restrictions on use: Fuel gas; none

1(d) Name, Address, and Telephone Number:

United States Steel Corporation Phone number: (412) 433-6840 (8:00 am to 5:00 pm)  
 600 Grant Street, Room 1662 FAX: (412) 433-5019  
 Pittsburgh, PA 15219-2800

1(e) Emergency Phone Number: 1-800-262-8200 (CHEMTREC)

### Section 2 – Hazard(s) Identification

2(a) Classification of the Chemical: Clean Coke Oven Gas is considered a hazardous material according to the criteria specified in REACH [REGULATION (EC) No 1907/2006] and CLP [REGULATION (EC) No 1272/2008] and OSHA 29 CFR 1910.1200 Hazard Communication Standard. The categories of Health Hazards as defined in "GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS), Third revised edition ST/SG/AC.10/30/Rev. 3" United Nations, New York and Geneva, 2009 have been evaluated. Refer to Section 3, 8 and 11 for additional information.

2(b) Signal Word, Hazard Statement(s), Symbols and Precautionary Statement(s):

Hazard Symbol	Hazard Classification	Signal Word	Hazard Statement(s)
	Flammable Gasses	WARNING	Extremely flammable gas May displace oxygen and cause rapid suffocation May cause genetic defects. May cause cancer. May damage fertility or the unborn child. Causes damage to the heart through prolonged or repeated exposures. Harmful if inhaled. Causes damage to blood forming tissues and central nervous system through prolonged or repeated exposure. May cause drowsiness or dizziness.
	Germ Cell Mutagenicity - 1B Carcinogenicity - 1A Reproductive Toxicity - 1A Single Target Organ Toxicity (STOT) Repeated Exposure - 1		
	Acute Toxicity-Oral - 4 STOT Following Single Exposure - 3		
None	Simple Asphyxiant - Single Category		

Precautionary Statement(s):

Prevention	Response	Storage/Disposal
Keep away from heat/sparks/open flames/hot surfaces. No smoking. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. Store in well-ventilated place. Do not breathe gas. Wear protective gloves / protective clothing / eye protection / face protection.	If exposed, concerned or feel unwell: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center or doctor if you feel unwell.	Store locked up. Dispose of contents in accordance with federal, state and local regulations.

# Clean Coke Oven Gas

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## Section 2 – Hazard(s) Identification

**2(b) Signal Word, Hazard Statement(s), Symbols and Precautionary Statement(s) (continued):**

**Precautionary Statement(s) (continued):**

Prevention	Response	Storage/Disposal
Wash thoroughly after handling. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not eat, drink or smoke when using this product.		

**2(c) Hazards not Otherwise Classified:** None Known

**2(d) Unknown Acute Toxicity Statement (Mixture):** None Known

## Section 3 – Composition/Information on Ingredients

**3(a-c) Chemical Name, Common Name (Synonyms), CAS Number and Other Identifiers, and Concentration:**

Chemical Name	CAS Number	EC Number	% Volume
Hydrogen	1333-74-0	215-605-7	42-65
Methane	74-82-8	200-812-7	17-34
Nitrogen	7727-37-9	231-783-9	1.2-18
Carbon Monoxide	630-08-0	211-128-3	4.6-7.5
Carbon Dioxide	124-38-9	204-696-9	0.2-3.5
Ethane	74-84-0	200-814-8	0.1 – 2.9
Oxygen	7782-44-2	231-956-9	0-2.6
Ethylene	74-85-1	200-815-3	0.1 – 2.5
Benzene	71-43-2	200-753-7	0 – 0.4

EC- European Community

CAS- Chemical Abstract Service

## Section 4 – First-aid Measures

**4(a) Description of Necessary Measures:** If exposed concerned or feel unwell: Get medical advice/attention.

- **Inhalation:** If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center or doctor if you feel unwell.
- **Eye Contact:** In case of contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing if eye irritation persists: Get medical advice/attention, if needed.
- **Skin Contact:** This material is a gas under normal atmospheric conditions. If exposed or concerned get medical advice/attention, if needed.
- **Ingestion:** This material is a gas under normal atmospheric conditions and ingestion is unlikely.

**4(b) Most Important Symptoms/Effects, Acute and Delayed (Chronic):**

**Acute effects:**

- **Inhalation:** When exposed at high concentrations will act as a simple asphyxiant. Simple asphyxiants displace the oxygen in the air and can cause symptoms of oxygen deprivation.
- **Eye:** May cause irritation
- **Skin:** None Expected
- **Ingestion:** This material is a gas under normal atmospheric conditions and ingestion is unlikely.

**Chronic Effects:**

- **Inhalation:** Prolonged or repeated exposures may result in respiratory disorders. Chronic obstructive pulmonary disease may also develop from fibrous obstruction of the smaller airways. Repeated exposure may cause chronic cough, bronchitis, asthma, vocal cord dysfunction, reactive airways disease, and lung fibrosis.
- **Eye:** May cause irritation
- **Skin:** Prolonged or repeated exposures may result in irritation and dermatitis.
- **Ingestion:** Repeated or prolonged ingestion of harmful amounts of this product as distributed is unlikely.

**4(c) Immediate Medical Attention and Special Treatment:** Treat symptomatically.

## Section 5 – Fire-fighting Measures

**5(a) Suitable (and unsuitable) Extinguishing Media:** Leaking gas fire: Do not extinguish, unless leak can be stopped safely or fire is immediately impacting human life. Eliminate all ignition sources if safe to do so. Extinguish with foam, carbon dioxide, dry powder or water fog, once leak is stopped. Do not use a solid stream of water as it may scatter and spread the fire.

**Section 5 – Fire-fighting Measures (continued)**

**5(b) Specific Hazards Arising from the Chemical:** Irritating vapors/gas may form in fire. Tactical considerations must be made regarding gas fed fires and if it is safe to fully extinguish visible flame before shut off of the gas is accomplished. Unburned gas may result and seek a source of ignition.

**5(c) Special Protective Equipment and Precautions for Fire-fighters:** Self-contained NIOSH approved respiratory protection and full protective clothing should be worn when fumes and/or smoke from fire are present. Firefighters should wear full face-piece self-contained breathing apparatus and chemical protective clothing with thermal protection. Direct water stream will scatter and spread flames and, therefore, should not be used. Evacuate area. Remove pressurized gas cylinders from the immediate vicinity. Cool containers exposed to flames with water until well after the fire is out. Close the valve if no risk is involved. Do not extinguish a leaking gas fire unless leak can be stopped. If leak cannot be stopped and no danger to surrounding area allow the fire to burn out. Fight fire from a protected location. Prevent buildup of vapors or gases to explosive concentrations.

**Section 6 - Accidental Release Measures**

**6(a) Personal Precautions, Protective Equipment and Emergency Procedures:** If leakage cannot be stopped, evacuate area. Contact Gas Services to perform testing before entering the area.

**6(b) Methods and Materials for Containment and Clean Up:** Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Collect material in appropriate, labeled containers for recovery or disposal in accordance with federal, state, and local regulations. Follow applicable OSHA regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

**Section 7 - Handling and Storage**

**7(a) Precautions for Safe Handling:** Keep away from heat/sparks/open flames/hot surfaces. No smoking. Eliminate all ignition sources if safe to do so. Practice good housekeeping.

**7(b) Conditions for Safe Storage, Including Any Incompatibilities:** Store in well-ventilated place. If feasible, store locked up.

**Section 8 - Exposure Controls / Personal Protection**

**8(a) Occupational Exposure Limits (OELs):** The following exposure limits are offered as reference, for an experience industrial hygienist to review.

Ingredients	OSHA PEL <sup>1</sup>	ACGIH TLV <sup>2</sup>	NIOSH REL <sup>3</sup>	IDLH <sup>4</sup>
Hydrogen	NE	NE (Simple Asphyxiant)	NE	NE
Methane	NE	NE (Asphyxiant)	NE	NE
Nitrogen	NE	Simple Asphyxiant	NE	NE
Carbon Monoxide	50 ppm	25 ppm	35 ppm "C" 200 ppm	1,200 ppm
Carbon Dioxide	5000 ppm	5000 ppm "STEL" 30,000 ppm	5000 ppm "STEL" 30,000 ppm	40,000 ppm
Ethane	NE	NE (Asphyxiant)	NE	NE
Oxygen	NE	NE	NE	NE
Ethylene	NE	200 ppm	NE	NE
Benzene	1.0 ppm * "STEL" 5.0 ppm *	0.5 ppm, skin "STEL" 2.5 ppm	0.1 ppm "STEL" 1.0 ppm	500 ppm, Ca

NE - None Established

\* Exposure limits based on 29 CFR 1910.1028, however refer to 29 CFR 1910.1000, Table Z-2 for exclusions.

1. OSHA PELs (Permissible Exposure Limits) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. A ("C") designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted. A Short Term Exposure Limit (STEL) is defined as a 15-minute exposure, which should not be exceeded at any time during a workday. An Action level (AL) is used by OSHA and NIOSH to express a health or physical hazard. They indicate the level of a harmful or toxic substance/activity, which requires medical surveillance, increased industrial hygiene monitoring, or biological monitoring. Action Levels are generally set at one half of the PEL but the actual level may vary from standard to standard. The intent is to identify a level at which the vast majority of randomly sampled exposures will be below the PEL.
  2. Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted. ACGIH TLVs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes. DSEN – May cause dermal sensitization. This notation is used to indicate the potential for dermal sensitization resulting from the interaction of an absorbed agent and ultraviolet light (i.e. photosensitization). RSEN – May cause respiratory sensitization.
  3. The National Institute for Occupational Safety and Health Recommended Exposure Limits (NIOSH-REL)- Compendium of Policy and Statements. NIOSH, Cincinnati, OH (1992). NIOSH is the federal agency designated to conduct research relative to occupational safety and health. As is the case with ACGIH TLVs, NIOSH RELs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes.
  4. The "immediately dangerous to life or health air concentration values (IDLHs)" are used by NIOSH as part of the respirator selection criteria and were first developed in the mid-1970's by NIOSH. The Documentation for Immediately Dangerous to Life or Health Concentrations (IDLHs) is a compilation of the rationale and sources of information used by NIOSH during the original determination of 387 IDLHs and their subsequent review and revision in 1994. Ca is designated as carcinogen.
- Simple Asphyxiant may not be assigned a TLV because the limiting factor is the available oxygen without other significant physiologic effects.

**8(b) Appropriate Engineering Controls:** Local exhaust ventilation should be used to control the emission of air contaminants. General dilution ventilation may assist with the reduction of air contaminant concentrations. Emergency eye wash stations and deluge safety showers should be available in the work area.

**Section 8 - Exposure Controls / Personal Protection (continued)**

**8(c) Individual Protection Measures:**

- **Respiratory Protection:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use only a NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. Concentration in air of the various contaminants determines the extent of respiratory protection needed. Use a positive-pressure-demand, full-face, supplied air respirator or SCBA for concentrations above 50 times the exposure limit. If exposure is above the IDLH for any of the constituents, or there is a possibility of an uncontrolled release or exposure levels are unknown, then use a positive-demand, full-face, supplied air respirator with escape bottle or SCBA.

**Warning!** Air-purifying respirators both negative-pressure and powered-air do not protect workers in oxygen-deficient atmospheres.

- **Eyes:** Wear appropriate eye protection to prevent eye contact.
- **Skin:** Wear appropriate personal protective clothing to prevent skin contact. This may include fire retardant clothing.
- **Other Protective Equipment:** An eyewash fountain and deluge shower should be readily available in the work area.

**Section 9 - Physical and Chemical Properties**

**9(a) Appearance (physical state, color, etc.):** colorless gas

**9(b) Odor:** Characteristic of hydrogen sulfide/hydrocarbons

**9(c) Odor Threshold:** NA

**9(d) pH:** NA

**9(e) Melting Point/Freezing Point:** NA

**9(f) Initial Boiling Point and Boiling Range:** NA

**9(g) Flash Point:** NA

**9(h) Evaporation Rate:** NA

**9(i) Flammability (solid, gas):** Flammable

NA - Not Applicable

ND - Not Determined for product as a whole

**9(j) Upper/Lower Flammability or Explosive Limits:** 34% - 4.4%

**9(k) Vapor Pressure:** NA

**9(l) Vapor Density(Air = 1):** 0.36

**9(m) Relative Density:** NA

**9(n) Solubility(ies):** Partial

**9(o) Partition Coefficient n-octanol/water:** NA

**9(p) Auto-ignition Temperature:** ND

**9(q) Decomposition Temperature:** ND

**9(r) Viscosity:** ND

**Section 10 - Stability and Reactivity**

**10(a) Reactivity:** May react suddenly with air, oxygen, halogens and with fine dispersed metal dust.

**10(b) Chemical Stability:** Stable under normal storage and handling conditions.

**10(c) Possibility of Hazardous Reaction:** No Data Found






**10(d) Conditions to Avoid:** Static discharge, sparks, open flames and other ignition sources.

**10(e) Incompatible Materials:** Oxidizing agents, halogens.

**10(f) Hazardous Decomposition Products:** Can produce carbon dioxide and carbon monoxide.

**Section 11 - Toxicological Information**


**11(a-e) Information on Toxicological Effects:** The following toxicity data has been determined for **Clean Coke Oven Gas** by using the information available for its components applied to the guidance on the preparation of an SDS under the GHS requirements of OSHA and the EU CPL:

Hazard Classification	Hazard Category		Hazard Symbols	Signal Word	Hazard Statement
	EU	OSHA			
<b>Acute Toxicity Hazard</b> (covers Categories 1-4)	4	4 <sup>a</sup>		<b>Warning</b>	Harmful if swallowed.
<b>Germ Cell Mutagenicity</b> (covers Categories 1A, 1B and 2)	1B	1B <sup>f</sup>		<b>Danger</b>	May cause genetic defects.
<b>Carcinogenicity</b> (covers Categories 1A, 1B and 2)	1A	1A <sup>e</sup>		<b>Danger</b>	May cause cancer.
<b>Toxic Reproduction</b> (covers Categories 1A, 1B and 2)	1A	1A <sup>h</sup>		<b>Danger</b>	May damage fertility or the unborn child.
<b>Specific Target Organ Toxicity (STOT) Following Single Exposure</b> (covers Categories 1-3)	3	3 <sup>i</sup>		<b>Warning</b>	May cause drowsiness or dizziness.

# Clean Coke Oven Gas

## Section 11 - Toxicological Information (continued)

**11(a-e) Information on Toxicological Effects (continued):**

Hazard Classification	Hazard Category		Hazard Symbols	Signal Word	Hazard Statement
	EU	OSHA			
<b>STOT following Repeated Exposures</b> (covers Categories 1 and 2)	1	1 <sup>j</sup>		<b>Danger</b>	Causes damage to lungs. Causes damage to blood and blood forming system through prolonged or repeated exposure
<b>Simple Asphyxiant</b> (Single Category)	NA*	Single Category	No Pictogram	<b>Warning</b>	May displace oxygen and cause rapid suffocation

\* NR Not Rated - Available data does not meet criteria for classification.

The Toxicological data listed below are presented regardless to classification criteria. Individual hazard classification categories where the toxicological information has met or exceeded a classification criteria threshold are listed above.

- a. No LC<sub>50</sub> or LD<sub>50</sub> has been established for **Clean Coke Oven Gas**. The following data has been determined for the components:
  - **Carbon Monoxide:** Rat LD<sub>50</sub> = 1300 ppm (REACH)  
Mouse LC<sub>50</sub> = 2444 ppm
  - **Ethylene:** LC<sub>50</sub> >57000 ppm/4hr
  - **Carbon Dioxide:** Rat LC<sub>50</sub> = 30000 – 50,000 ppm
  - **Benzene:** Rat LD<sub>50</sub> 3.8 (2.9-4.8) and 5.6 (4.0-7.8) ml/kg young and old resp.  
Rabbit LD<sub>50</sub>: > 9.4 ml/kg (abraded skin)
- b. No Skin Irritation data available for **Clean Coke Oven Gas** as a mixture. The following Skin Irritation information was found for the components:
  - **Benzene** - Mild to moderate in rabbits
- c. No Eye Irritation data available for **Clean Coke Oven Gas** as a mixture. The following Eye Irritation information was found for the components:
  - **Benzene** - Moderate to severe irritant; may cause corneal injury
- d. No Skin (Dermal)/Respiratory Sensitization data available for **Clean Coke Oven Gas** as a mixture or its individual components.
- e. No Aspiration Hazard data available for **Clean Coke Oven Gas** as a mixture or its individual components.
- f. No Germ Cell Mutagenicity data available for **Clean Coke Oven Gas** as a mixture. The following Germ Cell Mutagenicity information was found for the components:
  - **Benzene** - Chronic overexposure can cause chromosomal aberrations in animals and humans. Also, may induce sister-chromatid exchange (SCE), and micronuclei both *in vivo* and *in vitro*. Benzene overexposure has been shown to induce aneuploidy in dividing cells. Classified as a potential germ cell mutagen.
- g. Carcinogenicity: IARC, NTP, and OSHA do not list **Clean Coke Oven Gas** as carcinogens. The following Carcinogenicity information was found for the components:
  - **Ethylene:** IARC-3, unclassifiable as to carcinogenicity in humans; ACGIH TLV-A4, not classifiable as a human carcinogen
  - **Benzene:** IARC-1, carcinogen to humans; ACGIH TLV-A1, confirmed human carcinogen; NIOSH-Ca, potential occupational carcinogen; NTP-K, known to be a carcinogen; EPA-A, human carcinogen (by inhalation route of entry), EPA-K, cannot be determined, not classifiable as to human carcinogenicity; OSHA-Ca, carcinogen
- h. No Toxic Reproduction data available for **Clean Coke Oven Gas** as a mixture or its individual components.
  - **Carbon Monoxide:** Reproductive Categories on EU are adopted for GHS because Human Fetal Death has resulted from exposure of CO to mothers bearing children.
- i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for **Clean Coke Oven Gas** as a mixture. The following STOST following Single Exposure information was found for the components:
  - **Hydrogen, Methane, Ethane, Nitrogen gas** - May cause dizziness, headache, nausea and unconsciousness, and suffocation.
  - **Carbon Monoxide** - Central Nervous System effects: Headaches; tachypnea; nausea; weakness, dizziness, confusion, hallucinations; cyanosis; depressed ST segment of the ECG; angina; syncope; unconsciousness; death. Blood effects: carboxyhemoglobin formation.
  - **Ethylene** - Central Nervous System effects: Excessive exposures may cause headache, drowsiness, dizziness, loss of coordination, and extreme exposure may cause unconsciousness and death.
  - **Carbon Dioxide** - Lung effects: reduced inhalation and damage (rats). Cardiovascular effects: Decreased blood pressure (dogs) Central Nervous System effects: Headache, drowsiness, dizziness, stinging of the nose and throat, excitation rapid breathing and heart rate, excess salivation, vomiting, and unconsciousness (human).
  - **Oxygen** - At high exposure levels: Lung: Transient decrease in pulmonary function Central Nervous System effects: Nausea, vomiting, dizziness or vertigo, muscle twitching, vision changes, and loss of consciousness and generalized seizures
  - **Propylene** - Central Nervous System effects: light anesthesia in at 40% (rats); may cause dizziness, headache, nausea and unconsciousness, and suffocation (humans)
  - **Benzene** – Mild to moderate respiratory tract irritation expected with breathing vapors.
- j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available for **Clean Coke Oven Gas** as a whole. The following STOT following Repeated Exposure data was found for the components:
  - **Carbon Monoxide** - Damage to Heart by inhalation (REACH), Rat 72 wk Inhalation LOAEL = 200 ppm cardiac hypertrophy (REACH), Rat 13 wk inhalation NAOEL = 135 ppm
  - **Benzene** - Induced blood dyscrasias in humans were characterized by erythrocytic anisocytosis and poikilocytosis, anemia, decreased hemoglobin, and reduced hematocrit. In addition, benzene is a human carcinogen.

### Section 11 - Toxicological Information (continued)

#### 11(a-e) Information on Toxicological Effects (continued):

The above toxicity information was determined from available scientific sources to illustrate the prevailing posture of the scientific community. The scientific resources includes: The American Conference of Governmental Industrial Hygienist (ACGIH) Documentation of the Threshold Limit Values (TLVs) and Biological Exposure indices (BELs) with Other Worldwide Occupational Exposure Values 2020, The International Agency for Research on Cancer (IARC), The National Toxicology Program (NTP) updated documentation, the World Health Organization (WHO) and other available resources, the International Uniform Chemical Information Database (IUCLID), European Union Risk Assessment Report (EU-RAR), Concise International Chemical Assessment Documents (CICAD), European Union Scientific Committee for Occupational Exposure Limits (EU-SCOEL), Agency for Toxic Substances and Disease Registry (ATSDR), Hazardous Substance Data Bank (HSDB), and International Programme on Chemical Safety (IPCS).

The following health hazard information is provided regardless to classification criteria and is based on the individual component(s):

#### Acute Effects by Component:

- **HYDROGEN, METHANE, ETHYLENE, ETHANE and NITROGEN:** Simple asphyxiant
- **CARBON MONOXIDE:** Carbon monoxide reacts with hemoglobin to form carboxyhemoglobin. This form of hemoglobin has a reduced affinity to bind oxygen.
- **CARBON DIOXIDE:** Carbon dioxide has had lethal effects observed when atmospheric concentrations are increased above normal levels.
- **BENZENE:** Excessive exposures may cause irritation to eyes, skin, nose, throat, lungs, and respiratory tract. Central nervous system effects may occur due to excessive exposures. Excessive exposures may result in headaches, nausea, sleep disturbances, excitability, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

#### Delayed (chronic) Effects by Component:

- **HYDROGEN, METHANE, ETHYLENE, ETHANE, CARBON DIOXIDE and NITROGEN:** Not Reported
- **CARBON MONOXIDE:** Human Fetal Death has resulted from exposure of CO to mothers bearing children. Causes damage to blood and central nervous system through prolonged or repeated exposure if inhaled.
- **BENZENE:** Early signs and symptoms of chronic overexposure include effects on CNS and the GI tract (headache, loss of appetite, drowsiness, nervousness, and pallor) but the major manifestation of toxicity is aplastic anemia. Bone marrow depression may occur resulting in leucopenia, anemia, or thrombocytopenia (leukemogenic action). With continued over exposure the disease states may progress to pancytopenia resulting from bone marrow aplasia. Evidence has linked benzene in the etiology of leukemia.

### Section 12 - Ecological Information

**12(a) Ecotoxicity (aquatic & terrestrial):** No data available for the product, **Clean Coke Oven Gas** as a whole. However, individual components have been found to be toxic to the environment:

- **Ethylene:** EC<sub>50</sub> (Daphnia magna) = 53.402 mg/L
- **Benzene:** LC<sub>50</sub> Lepomis macrochirus (bluegill sunfish) 20 mg/l/24 to 48 hr /Conditions of bioassay not specified/; LC50 Salmo trutta (brown trout yearlings) 12 mg/l/1 hr (static bioassay)

**12(b) Persistence & Degradability:** Vapor-phase benzene is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 13 days for benzene

**12(c) Bioaccumulative Potential:** No Data Available

**12(d) Mobility (in soil):** Benzene has been estimated to be moderately to highly mobile in soil. Evaporation is expected to be the primary loss mechanism from water. Benzene is not expected to adsorb to sediment and suspended solids in water. Volatilization half-lives for a model river and model lake have been estimated to be 1 hr and 3.5 days for benzene.

**12(e) Other Adverse Effects:** None Known

#### Additional Information:

**Hazard Category:** No Category

**Signal Word:** No Signal Word

**Hazard Symbol:** No Hazard Symbol

**Hazard Statement:** No Hazard Statement

### Section 13 - Disposal Considerations

**Disposal:** Waste code D001: Waste Flammable material with a flash point <140°F. This material and its container must be disposed of as hazardous waste. Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste.

**Container Cleaning and Disposal:** Dispose of contents in accordance with federal, state and local regulations. Observe safe handling precautions. EWC: 16-05-04 (gases in pressure containers (including halons) containing dangerous substances; hazardous waste).

**Please note this information is for Clean Coke Oven Gas in its original form. Any alterations can void this information.**

# Clean Coke Oven Gas

USS IHS No.: IHS 82493

Rev. 10/20

## Section 14 - Transport Information

**14 (a-g) Transportation Information:**

**US Department of Transportation (DOT)** under 49 CFR 172.101 regulates **Clean Coke Oven Gas** as a hazardous material. All federal, state, and local laws and regulations that apply to the transport of this type of material must be adhered to.

<p><b>Shipping Name:</b> UN1954, Compressed gas, flammable, 2.1  <b>Shipping Symbols:</b> NA  <b>Hazard Class:</b> 2.1  <b>UN No:</b> UN1954  <b>Packing Group:</b> NA  <b>DOT/ IMO Label:</b> 2.1  <b>Special Provisions (172.102):</b> NA</p>	<p><b>Packaging Authorizations:</b>  <b>a) Exceptions:</b> 306  <b>b) Bulk:</b> 302, 305  <b>c) Non-bulk:</b> 314, 315</p>	<p><b>Quantity Limitations:</b>  <b>a) Passenger, Aircraft, or Railcar:</b> Forbidden  <b>b) Cargo Aircraft Only:</b> 150 kg  <b>Vessel Stowage Requirements</b>  <b>a) Vessel Stowage:</b> D  <b>b) Other:</b> 40  <b>DOT Reportable Quantities:</b> Note over 2500 lb shipment would exceed the threshold for Benzene and make it an RQ for Benzene</p>
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**International Maritime Dangerous Goods (IMDG) and the Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID)** classification, packaging and shipping requirements follow the US DOT Hazardous Materials Regulation.

**Regulations Concerning the International Carriage of Dangerous Goods by Road (ADR)** regulates **Clean Coke Oven Gas** as a hazardous material.

<p><b>Shipping Name:</b> Compressed gas, flammable, 2.1  <b>Classification Code:</b> 1F  <b>UN No.:</b> UN1954  <b>Packing Group:</b> NA  <b>ADR Label:</b> 2.1  <b>Special Provisions:</b> 274  <b>Limited Quantities:</b> LQ0, E0</p>	<p><b>Packaging:</b>  <b>a) Packing Instructions:</b> P200  <b>b) Special Packing Provisions:</b> NA  <b>c) Mixed Packing Provisions:</b> MP9</p>	<p><b>Portable Tanks &amp; Bulk Containers:</b>  <b>a) Instructions:</b> (M)  <b>b) Special Provisions:</b> NA</p>
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**International Air Transport Association (IATA)** regulates **Clean Coke Oven Gas** as a hazardous material.

<p><b>Shipping Name:</b> Compressed gas, flammable, 2.1  <b>Class/Division:</b> 2.1  <b>Hazard Label (s):</b> Flammable Gas  <b>UN No.:</b> 1954  <b>Packing Group:</b> NA  <b>Excepted Quantities (EQ):</b> E0</p>	<b>Passenger &amp; Cargo Aircraft</b>		<p><b>Cargo Aircraft Only:</b>  <b>Pkg Inst:</b> 200  <b>Max Net Qty/Pkg:</b>                  150 kg</p>	<p><b>Special Provisions:</b>                  A1  <b>ERG Code:</b> 10L</p>
	<p><b>Limited Quantity (EQ)</b></p>	<p><b>Pkg Inst:</b> Forbidden</p>		
		<p><b>Max Net Qty/Pkg:</b>                  Forbidden</p>		

Pkg Inst – Packing Instructions                      Max Net Qty/Pkg – Maximum Net Quantity per Package                      ERG – Emergency Response Drill Code

**Clean Coke Oven Gas** has a **Transport Dangerous Goods (TDG)** classification as **Compressed gas, flammable, n.o.s.**

## Section 15 - Regulatory Information

**Regulatory Information:** *The following listing of regulations relating to a U. S. Steel product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.* This product and/or its constituents are subject to the following regulations:

**SARA Potential Hazard Categories:** Immediate Acute Health Hazard, Delayed Chronic Health Hazard

**Section 313 Supplier Notification:** This product, **Clean Coke Oven Gas** contains the following toxic chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372:

CAS #	Chemical Name	Max Percent by Weight
71-43-2	Benzene	0.4
74-85-1	Ethylene	2.5

**State Regulations:** The product, **Clean Coke Oven Gas** as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations:

California Prop.  
65:



This product can expose you to chemicals including benzene which is known to the State of California to cause cancer; and carbon monoxide and benzene which is known to the State of California to cause reproductive toxicity. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

**Other Regulations:**

**WHMIS Classification (Canadian):** The product, **Clean Coke Oven Gas** is not listed as a whole. However individual components are listed.

Ingredients	WHMIS Classification
Nitrogen	Gases under pressure - Compressed gas; Simple asphyxiants - Category 1
Methane	Flammable gases - Category 1 (Lower flammable limit = 5.0 %); Gases under pressure - Compressed gas *; Simple asphyxiants - Category 1 (Gas that is liable to cause asphyxiation by the displacement of air)
Ethylene	Flammable gases – Category 1 (Lower flammable limit = 2.7%); Gases under pressure – Liquefied gas; Germ cell mutagenicity – Category 2; Simple asphyxiants – Category 1



# Clean Coke Oven Gas

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## Section 15 - Regulatory Information (continue)

**Other Regulations (continued):**

**WHMIS Classification (Canadian) (continued):**

Ingredients	WHMIS Classification
Carbon Monoxide	Flammable gases – Category 2 (Flammable limit - concentration range = 12 - 75 %); Gases under pressure - Compressed gas; Acute toxicity - inhalation - Category 3; Specific target organ toxicity - single exposure - Category 1; Reproductive toxicity - Category 1A (Adverse effects on the development of the offspring);
Oxygen	Oxidizing gases – Category 1 (Gas listed in ISO 10156:2010 standard); Gases under pressure - Compressed gas *
Hydrogen	Flammable gases - Category 1 [Flammable limit - concentration range = 4 - 75 % (71%)]; Gases under pressure - Compressed gas Simple asphyxiants - Category 1 (Gas that is liable to cause asphyxiation by the displacement of air)
Benzene	Flammable liquids - Category 2 [Flash point = -11°C closed cup (non-reported method) and boiling point = 80°C]; Skin corrosion/irritation - Category 2; Serious eye damage/eye irritation - Category 2; Germ cell mutagenicity - Category 1B; Carcinogenicity - Category 1A; Specific target organ toxicity - repeated exposure - Category 1; Aspiration hazard - Category 1 (Liquid hydrocarbon with a kinematic viscosity of 0.74 mm <sup>2</sup> /s at 20°C)

\* Compressed gas listed in: UN Recommendations on the TDG – Model Regulations Vol II.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

## Section 16 - Other Information

**Prepared By:** United States Steel Corporation

**Revision History:**

09/10/2020 – Update to sections 2, 8, 11, 15  
06/26/2017 – Update WHMIS 2015

**Expiration Date:** 10/20/2023

02/05/2014 - Update to OSHA HAZ COM 2012  
12/16/2010 - Original

**Additional Information:**

**Hazardous Material Identification System (HMIS) Classification**

Health Hazard	1
Fire Hazard	4
Physical Hazard	0

**National Fire Protection Association (NFPA)**



HEALTH = 1, Denotes possible chronic hazard if airborne dusts or fumes are generated Irritation or minor reversible injury possible.

FIRE = 4, Flammable gases, or very volatile flammable liquids with flash points below 73 °F, and boiling points below 100 F. Materials may ignite spontaneously with air. (Class IA).

PHYSICAL HAZARD = 0, Materials that are normally stable, even under fire conditions, and will not react with water, polymerize, decompose, condense, or self-react. Non-explosives.

HEALTH = 1, Exposure could cause irritation but only minor residual injury even if no treatment is given.

FIRE = 4, Will rapidly or completely vaporize at normal pressure and temperature, or is readily dispersed in air and will burn readily.

INSTABILITY = 0, Normally stable, even under fire exposure conditions, and are not reactive with water.

**ABBREVIATIONS/ACRONYMS:**

<b>ACGIH</b>	American Conference of Governmental Industrial Hygienists	<b>NIF</b>	No Information Found
<b>BEIs</b>	Biological Exposure Indices	<b>NIOSH</b>	National Institute for Occupational Safety and Health
<b>CAS</b>	Chemical Abstracts Service	<b>NTP</b>	National Toxicology Program
<b>CERCLA</b>	Comprehensive Environmental Response, Compensation, and Liability Act	<b>ORC</b>	Organization Resources Counselors
<b>CFR</b>	Code of Federal Regulations	<b>OSHA</b>	Occupational Safety and Health Administration
<b>CNS</b>	Central Nervous System	<b>PEL</b>	Permissible Exposure Limit
<b>GI, GIT</b>	Gastro-Intestinal, Gastro-Intestinal Tract	<b>PNOR</b>	Particulate Not Otherwise Regulated
<b>HMS</b>	Hazardous Materials Identification System	<b>PNOC</b>	Particulate Not Otherwise Classified
<b>IARC</b>	International Agency for Research on Cancer	<b>PPE</b>	Personal Protective Equipment
<b>LC50</b>	Median Lethal Concentration	<b>ppm</b>	parts per million
<b>LD50</b>	Median Lethal Dose	<b>RCRA</b>	Resource Conservation and Recovery Act
<b>LD<sub>Lo</sub></b>	Lowest Dose to have killed animals or humans	<b>RTECS</b>	Registry of Toxic Effects of Chemical Substances
<b>LEL</b>	Lower Explosive Limit	<b>SARA</b>	Superfund Amendment and Reauthorization Act
<b>µg/m<sup>3</sup></b>	microgram per cubic meter of air	<b>SCBA</b>	Self-contained Breathing Apparatus
<b>mg/m<sup>3</sup></b>	milligram per cubic meter of air	<b>STEL</b>	Short-term Exposure Limit
<b>mppcf</b>	million particles per cubic foot	<b>TLV</b>	Threshold Limit Value
<b>SDS</b>	Safety Data Sheet	<b>TWA</b>	Time-weighted Average
<b>MSHA</b>	Mine Safety and Health Administration	<b>UEL</b>	Upper Explosive Limit
<b>NFPA</b>	National Fire Protection Association		

**Disclaimer:** This information is taken from sources or based upon data believed to be reliable. However, United States Steel Corporation makes no warranty as to the absolute correctness or sufficiency of any of the foregoing or that additional or other measures may not be required under particular conditions.