

TECHNICAL DATA SHEET

Hydrochloric Acid 31% ACS Grade

ACS · 31%

CAS NUMBER
7647-01-0

ALLIANCE CODE
hydrochloric-acid-31-acs-grade

GENERATED
2026-07-21

1. IDENTITY & COMPOSITION

PRODUCT NAME
Hydrochloric Acid 31% ACS Grade

ALLIANCE CODE
hydrochloric-acid-31-acs-grade

GRADE
ACS

CONCENTRATION
31%

CAS NUMBER
7647-01-0 **Adjudicated**

FORMULA
ClH **Adjudicated**

MOLECULAR WEIGHT
36.46 **Adjudicated**

PRODUCT TYPE
solution

AVAILABLE GRADES SAME CAS, ALTERNATE GRADES AND CONCENTRATIONS

GRADE	CONCENTRATION	TYPICAL ASSAY	SKU
THIS GRADE ACS	31%	—	current
ACS Reagent	37%	—	hydrochloric-acid-37-acs-reagent-grade
Technical Grade	37%	—	hydrochloric-acid-37-hcl-37-technical-grade
Technical Grade	31%	—	hydrochloric-acid-31-technical-grade
—	25%	—	hydrochloric-acid-25-acs-grade

GRADE	CONCENTRATION	TYPICAL ASSAY	SKU
—	25%	—	hydrochloric-acid-25-technical-grade
ACS	15%	—	hydrochloric-acid-15-acs-grade
Technical Grade	15%	—	hydrochloric-acid-15-technical-grade
ACS	5%	—	hydrochloric-acid-5-acs-grade
Technical Grade	5%	—	hydrochloric-acid-5-technical-grade
—	—	—	hydrochloric-acid-10-acs-grade
—	—	—	hydrochloric-acid-10-technical-grade
—	—	—	hydrochloric-acid-20-acs-grade

Typical assay shown is the rolling-window mean from the sibling product's most recent lots. Grade selection drives downstream end-use — verify the sibling grade matches your specification before substitution.

PHYSICAL & CHEMICAL PROPERTIES

APPEARANCE

Clear, colorless to slightly yellow liquid

[Product record](#)

ODOR

Pungent, irritating [Product record](#)

SPECIFIC GRAVITY (20 °C)

~1.155 [Product record](#)

BOILING POINT

~85–90 °C (fumes) [Product record](#)

FLASH POINT

Not flammable [Product record](#)

FORM

Liquid [Product record](#)

PH

<1 [Product record](#)

DENSITY

1.15–1.16 g/cm³ (31%, 20°C) [Product record](#)

MELTING POINT

< –40 °C [Product record](#)

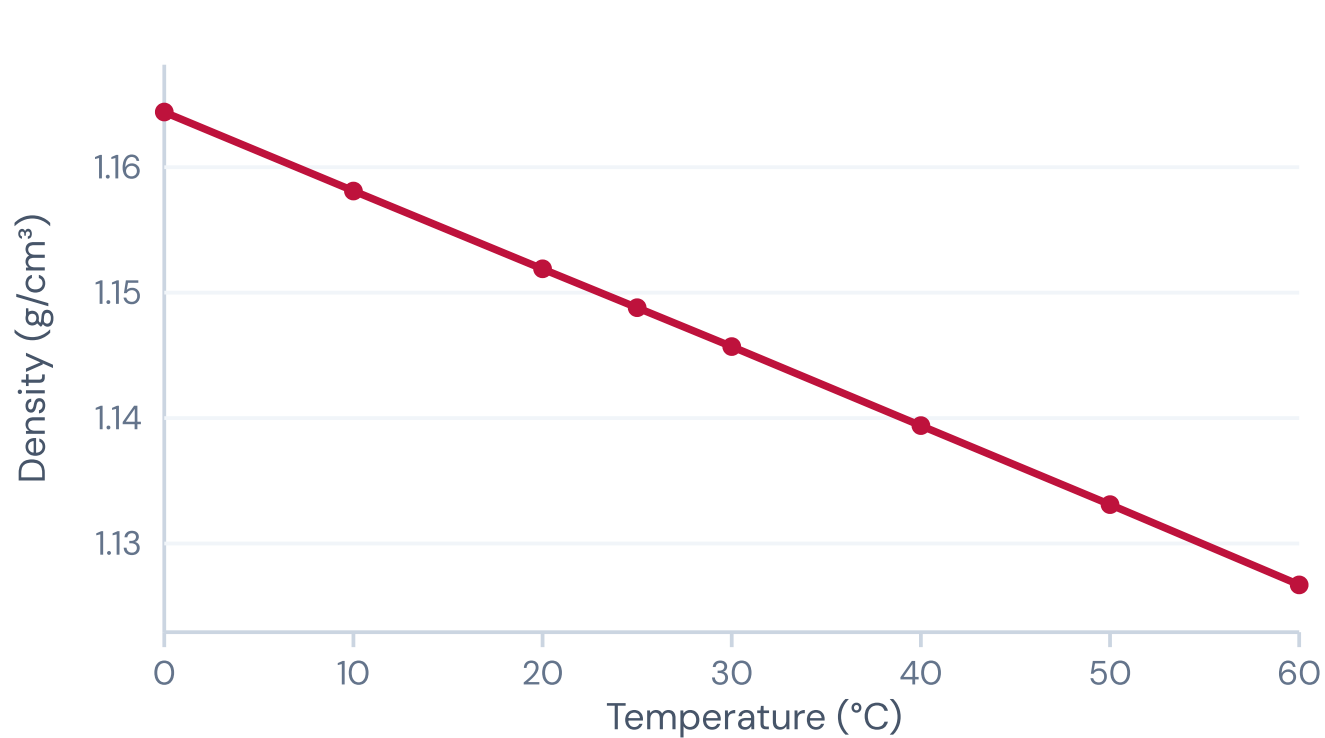
SOLUBILITY (WATER)

Miscible with water [Product record](#)

Strong acid — density and vapor–pressure values shown are at 20 °C; values shift markedly with concentration and temperature. Reference concentration–temperature curves before specifying equipment.

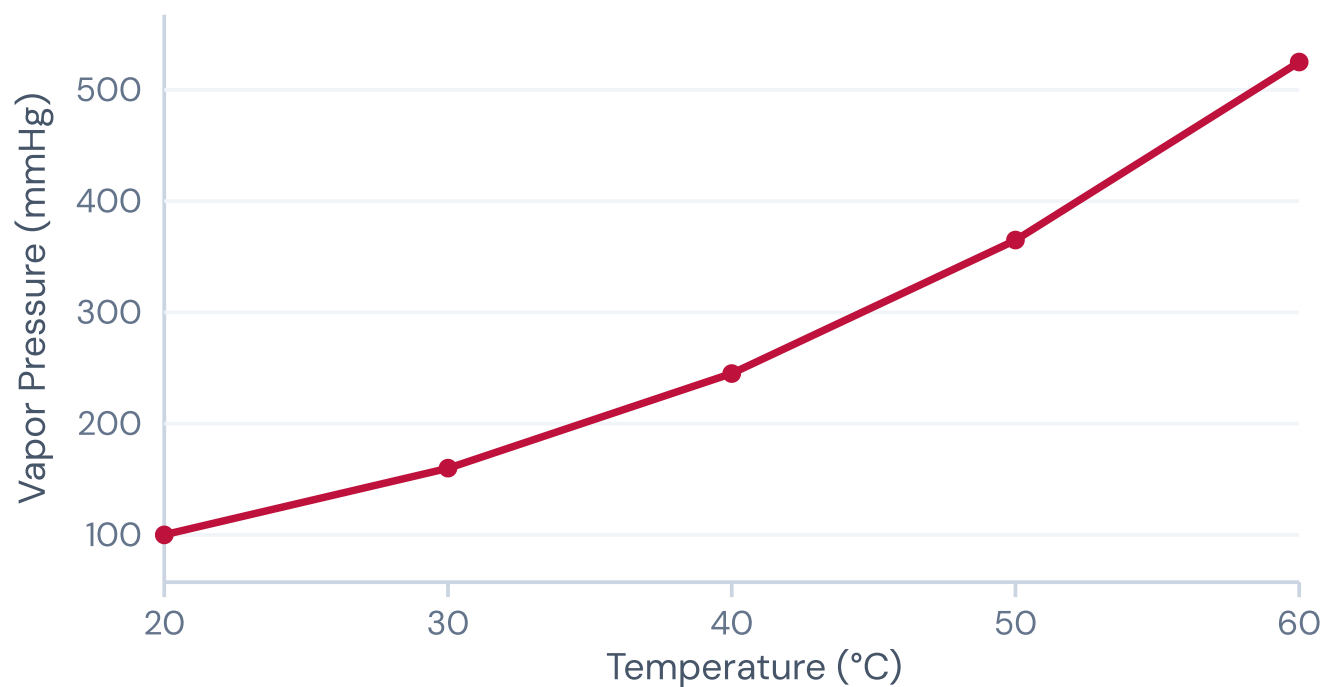
PROPERTY CURVES

Density vs. Temperature (31%)



Source: [Perry's Chemical Engineers' Handbook \(31% reference\)](#)

Vapor Pressure vs. Temperature (31%)



Source: [Perry's Chemical Engineers' Handbook \(31% reference\)](#)

Reference curves drawn from public engineering data. For engineering use, consult the cited source for the underlying tabulated values.

MATERIALS OF CONSTRUCTION SERVICE ENVELOPE ≈ 31%

MATERIAL	RATING	MAX T (°C)	NOTES	SOURCE
Buna-N (NBR) Elastomer	Poor	—	Swells and degrades	Cole-Parmer Chemical Compatibility
EPDM Elastomer	Good	40	Acceptable but FKM preferred	Cole-Parmer Chemical Compatibility
Viton (FKM) Elastomer	Good	80	Acceptable for HCl gaskets up to 37 %.	Parker O-ring Chemical Compatibility
PTFE Fluoropolymer	Excellent	200	Lining and gaskets	Cole-Parmer Chemical Compatibility
PVDF (Kynar) Fluoropolymer	Excellent	120	Excellent for HCl piping at elevated temperature.	Cole-Parmer Chemical Compatibility
Borosilicate Glass Glass Ceramic	Excellent	100	Inert to most strong acids (avoid HF).	Cole-Parmer Chemical Compatibility
Glass (borosilicate) Glass Ceramic	Excellent	100	Inert under all conditions	Cole-Parmer Chemical Compatibility
316 stainless steel Metal	Poor	25	Severe pitting; use only for vapors	Cole-Parmer Chemical Compatibility
Aluminium Metal	Not recommended	—	Reacts to form H2 gas	Cole-Parmer Chemical Compatibility
Carbon steel Metal	Not recommended	—	Aggressive corrosion	Cole-Parmer Chemical Compatibility

MATERIAL	RATING	MAX T (°C)	NOTES	SOURCE
Carbon Steel Metal	Not recommen ded	—	Catastrophic corrosion; never use.	Cole-Parmer Chemical Compatibility
Hastelloy C- 276 Metal	Excellent	90	Premium HCl alloy	Cole-Parmer Chemical Compatibility
Inconel 625 Metal	Good	60	Acceptable for dilute service	Cole-Parmer Chemical Compatibility
Tantalum Metal	Excellent	100	Best-in-class but expensive	Cole-Parmer Chemical Compatibility
CPVC Thermoplastic	Excellent	90	Preferred for elevated temperature	Cole-Parmer Chemical Compatibility
FRP (vinyl ester) Thermoplastic	Good	60	Common bulk-storage tank material	Cole-Parmer Chemical Compatibility
HDPE Thermoplastic	Excellent	60	Standard drum / IBC material	Cole-Parmer Chemical Compatibility
PVC Thermoplastic	Excellent	60	Standard piping for ambient service	Cole-Parmer Chemical Compatibility

Ratings reflect the service envelope (concentration × temperature) shown. Always confirm against your specific duty cycle and contact-time before equipment selection. The most cautious rating across overlapping references is shown.

REGULATORY & TRANSPORT

DOT / 49 CFR

UN NUMBER

UN1789 **Adjudicated**

PACKING GROUP

II **Adjudicated**

HAZARD CLASS

8 **Adjudicated**

PROPER SHIPPING NAME

Hydrochloric acid **Adjudicated**

GHS / OSHA HAZCOM 2012

SIGNAL WORD

Danger **Adjudicated**

H-CODES (HAZARD STATEMENTS)

H290, H314, H335 **Adjudicated**

P-CODES (PRECAUTIONARY STATEMENTS)

P260, P261, P264, P271, P280, P301+P330+P331,
P303+P361+P353, P304+P340, P305+P351+P338,
P310, P321, P363, P403+P233, P405, P501...

OCCUPATIONAL EXPOSURE LIMITS

OSHA PEL (29 CFR 1910.1000)

— **unknown**

ACGIH TLV

— **unknown**

NIOSH REL

— **unknown**

NIOSH IDLH

— **unknown**

Transport descriptions reflect 49 CFR 172.101 lookup at time of publication. Sourced data: ECHA CLP Annex VI for harmonised classifications, NIOSH Pocket Guide for REL/IDLH, OSHA Z-Tables for PEL. Always verify against the latest regulatory text before shipment-critical decisions.

Supplier Qualification Packet

One zipped download containing the TDS, SDS, latest lot COA (when available), and a fresh Letter of Continuing Guaranty for Hydrochloric Acid 31% ACS Grade. Every file included is SHA-256 hashed and listed in a manifest your QA team can audit.

APPLICATION GUIDANCE

Hydrochloric Acid 31% ACS Grade (ACS) is a strong mineral acid used across pH control, metal pickling, food and beverage processing, and chemical synthesis. Grade and concentration determine the appropriate end-use and materials.

- Metal pickling, etching, and surface preparation
- pH adjustment in water and wastewater treatment
- Regeneration of ion-exchange resins
- Chemical manufacturing and synthesis
- Food and beverage processing (food-grade only)

Always add acid to water, never water to acid. Use lined or fluoropolymer piping rated for the concentration; carbon steel is not suitable for dilute acid service.

STORAGE & HANDLING

RECOMMENDED STORAGE

Cool, dry, well-ventilated area in compatible containers (lined steel, HDPE, FRP — verify per concentration). Segregate from bases, oxidizers,...

INCOMPATIBILITIES

Bases, active metals (aluminium, zinc), cyanides, sulfides, oxidizing agents. Reacts violently with organic anhydrides.

HANDLING PRECAUTIONS

Use full PPE including face shield, acid-resistant gloves and apron. Add acid to water slowly with stirring; never reverse. Ventilation required.

SHELF LIFE

24 months from date of manufacture in sealed, original packaging

For full hazard, PPE, and emergency response guidance, refer to the Safety Data Sheet (SDS) for this product. The SDS controls in all cases where guidance differs.

PACKAGING & LOGISTICS

SHIPPING DESCRIPTION (US DOT)

UN1789, Hydrochloric acid, 8, PG II

Sourced from 49 CFR 172.101. Confirm against shipping documents and carrier requirements before tender.

NMFC CLASS 60	PLACARD Corrosive	PACKING GROUP PG II
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TEST METHODS

PARAMETER	METHOD	AUTHORITY	UNIT
Aluminum	ICP-MS	—	ppm
Appearance	Visual Inspection	—	
Arsenic	ICP-MS	—	ppm
Assay	Titration	—	%
Barium	ICP-MS	—	ppm
Boron	ICP-MS	—	ppm
Cadmium	ICP-MS	—	ppm
Calcium	ICP-MS	—	ppm
Chloride	ICP	—	ppm
Chloride Free	Titration	—	ppm
Chromium	ICP-MS	—	ppm
Cobalt	ICP-MS	—	ppm
Color	Spectrophotometry	—	APHA
Copper	ICP-MS	—	ppm
Fluoride	Ion Chromatography	—	ppm
Heavy Metals	ICP-MS (as Pb)	—	ppm
Iron	ICP-MS	—	ppm
Lead	ICP-MS	—	ppm

PARAMETER	METHOD	AUTHORITY	UNIT
Magnesium	ICP-MS	—	ppm
Manganese	ICP-MS	—	ppm
Mercury	ICP-MS	—	ppm
Nickel	ICP-MS	—	ppm
Nitrate	ICP	—	ppm
pH	pH Meter	—	
Phosphate	ICP	—	ppm
Potassium	ICP-MS	—	ppm
Residue	Residue on Ignition	—	%
Silicon	ICP-MS	—	ppm
Silver	ICP-MS	—	ppm
Sodium	ICP-MS	—	ppm
Specific Gravity	Hydrometer @ 25°C	—	g/mL
Strontium	ICP-MS	—	ppm
Sulfate	ICP	—	ppm
Sulfite	ICP	—	ppm
Tin	ICP-MS	—	ppm
Turbidity	EPA 180.1	—	NTU
Zinc	ICP-MS	—	ppm

Methods listed are those used to generate the referenced COA. Equivalent or compendial methods may be substituted with documented bridging.

This Technical Data Sheet is provided for technical reference. The Safety Data Sheet (SDS) controls in all cases where guidance differs. Values reflect Alliance Chemical canonical data at time of generation; subsequent revisions are recorded in the Revision History above.

ALLIANCE CHEMICAL

Order Hydrochloric Acid 31% ACS Grade

Bulk & packaged sizes · COA/SDS ships with every order