

# HOLLYFRONTIER BASE OILS

THE BASE OILS OF CHOICE™  
FOR COMPOUNDING YOUR FINEST FINISHED LUBRICANTS



  
**HOLLYFRONTIER™**  
BASE OILS



# HOLLYFRONTIER™

## BASE OILS

THE BASE OILS OF CHOICE™

HOLLYFRONTIER CORPORATION, AMERICA'S FASTEST GROWING  
REFINER OF HIGH QUALITY LUBRICANTS AND SPECIALTY OILS.



OFF ROAD



MARINE



INDUSTRIAL



METALWORKING



RAILROAD

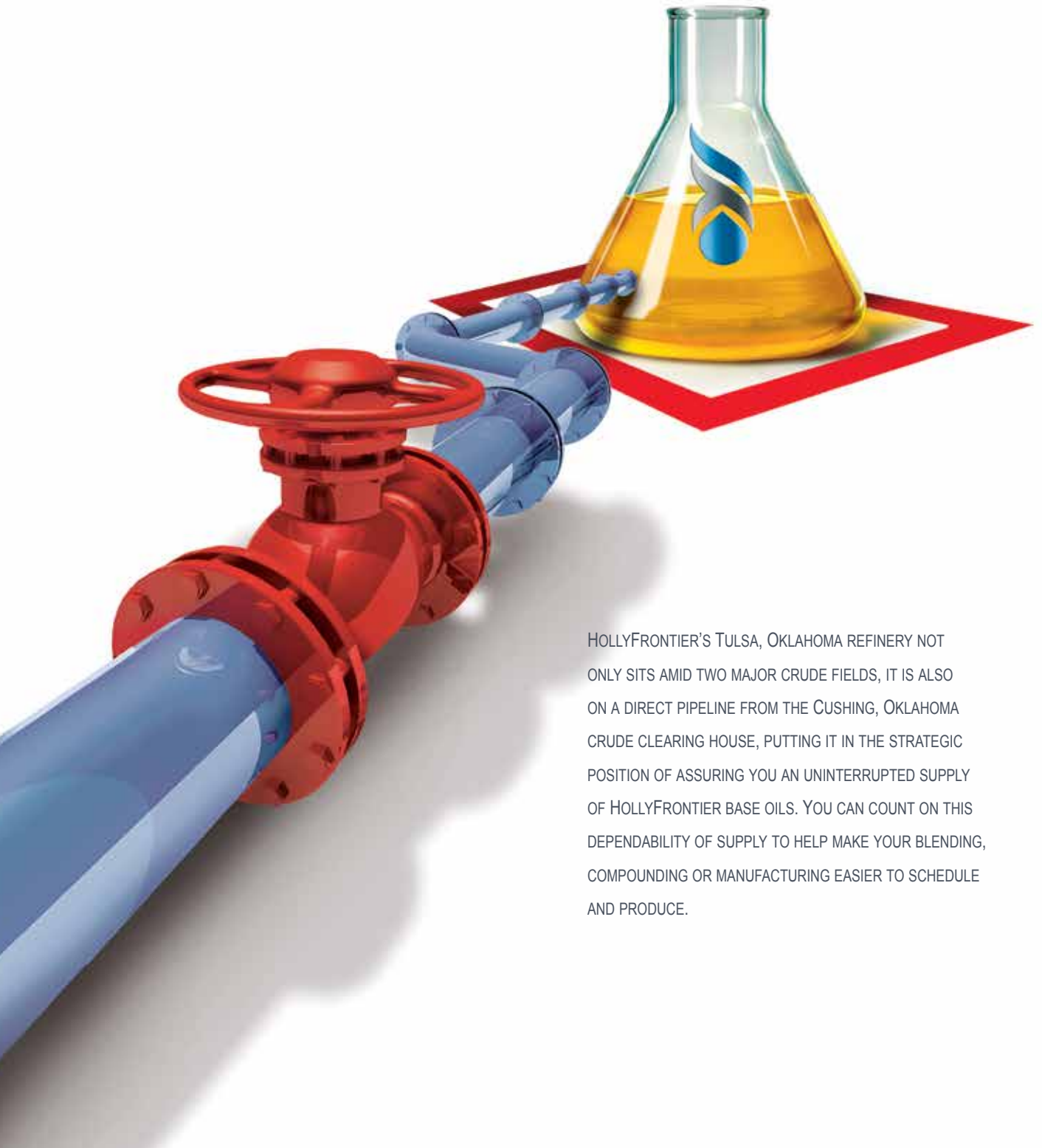


SMALL ENGINE

HOLLYFRONTIER IS THE SECOND LARGEST INDEPENDENT PETROLEUM REFINER IN THE UNITED STATES. A FORTUNE 500 COMPANY, LISTED ON THE NEW YORK STOCK EXCHANGE (HFC), HOLLYFRONTIER OPERATES FIVE MAJOR REFINERIES: TULSA, OK; ARTESIA, NM; CHEYENNE, WY; EL DORADO, KS AND WOODS CROSS, UT (SALT LAKE CITY AREA) WITH A CAPACITY OF OVER 457,000 BARRELS PER DAY. HOLLYFRONTIER REFINING & MARKETING BRINGS YOU BASE OILS OF THE HIGHEST QUALITY, CONSISTENCY AND RELIABILITY, MAKING YOUR BLENDING, COMPOUNDING OR MANUFACTURING EASIER AND MORE REWARDING.



The world's best crude travels on a  
**pipeline directly to HollyFrontier**



HOLLYFRONTIER'S TULSA, OKLAHOMA REFINERY NOT ONLY SITS AMID TWO MAJOR CRUDE FIELDS, IT IS ALSO ON A DIRECT PIPELINE FROM THE CUSHING, OKLAHOMA CRUDE CLEARING HOUSE, PUTTING IT IN THE STRATEGIC POSITION OF ASSURING YOU AN UNINTERRUPTED SUPPLY OF HOLLYFRONTIER BASE OILS. YOU CAN COUNT ON THIS DEPENDABILITY OF SUPPLY TO HELP MAKE YOUR BLENDING, COMPOUNDING OR MANUFACTURING EASIER TO SCHEDULE AND PRODUCE.





LONG RECOGNIZED AS ONE OF THE WORLD'S LARGEST MANUFACTURERS OF BRIGHT STOCK, HOLLYFRONTIER'S TULSA REFINING OPERATIONS ALSO PRODUCE ONE OF THE BROADEST RANGES OF HIGH QUALITY BASE STOCKS IN THE UNITED STATES. ITS GROUP I+ BASE OILS ARE UNIQUE IN THAT THEY HAVE THE HIGHEST SATURATE LEVELS OF ANY OILS IN GROUP I. KNOWING THAT SATURATE CONTENT IS A KEY DRIVER OF LUBRICANT QUALITY, WE ONLY PRODUCE BASE STOCKS WITH A VERY PRECISE, OPTIMUM SATURATES RANGE. WHILE GROUP I BASE STOCKS TYPICALLY RANGE FROM 69%-89% SATURATE LEVELS, HOLLYFRONTIER'S GROUP I+ BASE STOCKS ARE PRODUCED EXCLUSIVELY BETWEEN 85%-89% SATURATES.

COUPLE THAT WITH LOW VOLATILITY AND LOW SULFUR CONTENT AND YOU HAVE THE POTENTIAL TO COMPOUND YOUR FINISHED LUBRICANTS AT LOWER COST THAN BY USING OTHER GROUP I, GROUP II OR GROUP III OILS FOR THE SAME PURPOSE.

HOLLYFRONTIER...THE BASE OILS OF CHOICE

## HollyFrontier Base Oils, **the Base Oils of Choice** for Industrial Applications



WHETHER IT'S OUR UNIQUE FEED STOCKS OR OUR PROPRIETARY IMPROVEMENTS IN THE REFINING PROCESS, OR A COMBINATION OF BOTH, THE RESULT IS BASE OILS WITH CHARACTERISTICS UNIQUELY SUITED FOR COMPOUNDING INTO OUTSTANDING INDUSTRIAL OILS. IN FACT, FOR SHEAR STRENGTH AND COST-EFFECTIVE PERFORMANCE IN THE FOLLOWING APPLICATIONS, YOU'LL FIND HOLLYFRONTIER THE BEST AND MOST APPROPRIATE CHOICE FOR:

- GEAR OILS
- METALWORKING OILS
- COMPRESSOR OILS
- SMALL ENGINE OILS
- QUENCHING OILS
- HYDRAULIC OILS
- GREASE
- HEAT TRANSFER OILS
- ROLL OILS

TABLE I: NLGI GRADE SYSTEM  
FOR LUBRICATING GREASES

NLGI Grade Number	ASTM Penetration at 77°F (25°C)
000	445 to 475
00	400 to 430
0	355 to 385
1	310 to 340
2	265 to 295
3	220 to 250
4	175 to 205
5	130 to 160
6	85 to 115

\* ASTM D217  
\*\* Block pen

TABLE II: RELATED GEAR OIL  
DESIGNATIONS

API Service Designation	Military Specification Equivalent
GL-4	MIL-L-2105
GL-5*	MIL-L-2105B, C, or D, MIL-PRF-2105E
MT-1	MIL-PRF-2105E

\* Also satisfies SAE J2360



## HollyFrontier Base Oils, **the Base Oils of Choice** for Transportation Applications



THESE DESIRABLE CHARACTERISTICS MAKE HOLLYFRONTIER BASE OILS IDEAL CANDIDATES FOR BLENDING AND COMPOUNDING YOUR HEAVY DUTY LUBRICANTS:

- CONSISTENT SPECS
- LOW NOACK VOLATILITY
- LOW AROMATICS
- SUPERIOR SOLVENCY FOR EXCELLENT ADDITIVE RESPONSE
- HIGH OXIDATIVE STABILITY
- LOW SULFUR
- HIGH API GRAVITIES

COUPLE THESE WITH HOLLYFRONTIER'S UNIQUE SITUATION ATOP OR ADJACENT TO A CONSTANT SOURCE OF CRUDE, PLUS A STORAGE CAPACITY OF OVER 1 MILLION BARRELS, AND YOU ARE ASSURED NOT ONLY OF CONSISTENT SPECS, BUT OF AN UNINTERRUPTED SOURCE OF SUPPLY. WE ALSO HAVE TECHNICAL INFORMATION ON FILE TO HELP YOU FORMULATE FOR MOST APPLICATIONS IN:

- CONSTRUCTION
- MARINE ENGINES
- FUEL AND LUBRICANT ADDITIVE CARRIER OILS
- OFF-ROAD ENGINES AND EQUIPMENT
- RAILROAD ENGINES



TABLE III: SAE CRANKCASE OIL VISCOSITY CLASSIFICATIONS

SAE Viscosity Grade	Low Temperature Viscosities		High Temperature Viscosities		
	Engine Cranking Max. cPs at Temp (°C)	Max. Temp for Pumping Viscosity of 60,000 cP(°C)	Viscosity at 100 °C, cSt		High Shear (cP) at 150°C and 10 <sup>6</sup> S <sup>-1</sup> Min.
	Min.	Max.	Min.	Max.	
Winter Service					
0W	6200 @ -35	-40	3.8	--	--
5W	6600 @ -30	-35	3.8	--	--
10W	7000 @ -25	-30	4.1	--	--
15W	7000 @ -20	-25	5.6	--	--
20W	9500 @ -15	-20	5.6	--	--
25W	13000 @ -10	-15	9.3	--	--
Summer Service					
20	--	--	5.6	<9.3	2.6
30	--	--	9.3	<12.5	2.9
40	--	--	12.5	<16.3	3.5*
40	--	--	12.5	<16.3	3.7**
50	--	--	16.3	<21.9	3.7
60	--	--	21.9	<26.1	3.7

\* (0W-40, 5W-40, and 10W-40 grades)

\*\* (15W-40, 20W-40, 25W-40, and 40 grades)





## HollyFrontier Refining & Marketing Service... from our start to your finish

### HollyFrontier's Technical Assistance

TO HELP CUSTOMERS MAKE THE BEST USE OF HOLLYFRONTIER BASE OILS, OUR TECHNICAL SPECIALISTS ARE AVAILABLE TO ANSWER QUESTIONS AND PROVIDE GUIDANCE REGARDING PRODUCT APPLICATIONS, COMPOUNDING AND TESTING. THE AVAILABILITY OF THIS TECHNICAL EXPERTISE OFFERS CUSTOMERS AN ADDITIONAL RESOURCE THAT IS NOT READILY AVAILABLE FROM COMMODITY SUPPLIERS.

HOLLYFRONTIER'S PRIMARY CONSIDERATION IS TO ENSURE THAT ITS CUSTOMERS DO NOT EXPERIENCE UNEXPECTED ISSUES AS A RESULT OF THE REACH (REGISTRATION, EVALUATION, AUTHORIZATION AND RESTRICTION OF CHEMICALS) LEGISLATION (EC 1907/2006). OUR EXPECTATION IS FOR MOST, IF NOT ALL, HOLLYFRONTIER OILS TO REMAIN UNAFFECTED BY REACH BY ENSURING THAT REGULATORY DUTIES AND CUSTOMER EXPECTATIONS ARE MET. CURRENTLY ALL PRODUCTS ARE PREREGISTERED UNDER REACH.

WE'RE HERE TO HELP. YOU CAN START BY CALLING **1-800-TECH-REP** FOR KNOWLEDGEABLE ANSWERS TO YOUR TECHNICAL QUESTIONS.

### HollyFrontier's Commitment to Operations Integrity and Quality

HOLLYFRONTIER'S QUALITY MANAGEMENT SYSTEM IS THE DRIVING FORCE BEHIND THE COMPANY'S COMMITMENT TO

OPERATIONS INTEGRITY. OUR REFINING AND MARKETING BUSINESS HAS UNDERGONE THIRD-PARTY CERTIFICATION AUDITS BY NSF, INTERNATIONAL STRATEGIC REGISTRATIONS, LTD. (NSF-ISR).

### Certified ISO 9001

HOLLYFRONTIER BASE OILS ARE PRODUCED IN STRICT COMPLIANCE WITH STATISTICAL PROCESS CONTROL, MANAGED THROUGH THE LATEST VERSION OF THE ISO 9001 QUALITY MANAGEMENT SYSTEM TO ENSURE CONSISTENT QUALITY.





## Logistics

HOLLYFRONTIER IS PROUD TO OFFER ONE OF THE MOST EFFICIENT AND RELIABLE TRANSPORTATION SYSTEMS IN THE INDUSTRY. OUR FLEET OF 1100 RAIL CARS OPERATES OUT OF OUR CENTRALLY LOCATED REFINERY AND OUR STRATEGICALLY LOCATED TERMINALS AROUND THE COUNTRY, INSURING PROMPT BULK DELIVERY.

## Electronic Information Systems

THE TECHNOLOGY AT THE HEART OF HOLLYFRONTIER'S TRANSPORTATION SYSTEM ENABLES ACCURACY, SPEED, CURRENT INFORMATION, AND INTEGRATION WITH YOUR SYSTEM.

- **HOLLYFRONTIER'S RAIL TRACKING SERVICE:**

OUR RAILCAR TRACKING, PERFORMANCE MEASUREMENT AND MANAGEMENT SYSTEM PROVIDES DAILY REPORTS ON CAR LOCATION AND FORECASTED ARRIVAL DATES TO HELP ALLEVIATE THE UNCERTAINTIES INHERENT IN RAILCAR SHIPMENT.

- **HOLLYFRONTIER RATE TRACKER SERVICE:** OUR AUTOMATED FREIGHT RATING SYSTEM ENSURES FREIGHT COST ACCURACY ON INVOICES AND REDUCES THE CHANCE FOR ERROR.

- **ELECTRONIC DATA INTERCHANGE** ENABLES HOLLYFRONTIER TO ELECTRONICALLY EXCHANGE BILL OF LADING AND FREIGHT BILL DATA WITH SEVEN RAIL CARRIERS TO ENSURE ACCURACY AND TIMELINESS IN PROCESSING.

## Service

HOLLYFRONTIER'S INTEGRATED SYSTEM MAY OFFER A TRANSPORTATION PACKAGE THAT BEST MEETS YOUR NEEDS. IF YOU DECIDE YOU WOULD LIKE TO HAVE HOLLYFRONTIER COORDINATE YOUR TRANSPORTATION REQUIREMENTS, THERE MAY BE AN ATTRACTIVE ECONOMY OF SCALE, BECAUSE WE COMBINE OUR INBOUND AND OUTBOUND REQUIREMENTS FOR GREATER NEGOTIATING POWER. ALL THIS TRANSLATES INTO ADDED RELIABILITY AND CONVENIENCE AS WELL AS SAVINGS FOR YOU.

## HOLLYFRONTIER'S VALUES

### Health & Safety:

**We put health and safety first.**

WE CONDUCT OUR BUSINESS WITH HIGH REGARD FOR THE HEALTH AND SAFETY OF OUR EMPLOYEES, CONTRACTORS, AND NEIGHBORING COMMUNITIES. WE CONTINUOUSLY STRIVE TO RAISE THE BAR, GUIDED BY OUR STRINGENT HEALTH AND SAFETY PERFORMANCE STANDARDS.

### Environmental Stewardship:

**We care about the environment.**

WE ARE COMMITTED TO MINIMIZING ENVIRONMENTAL IMPACTS BY REDUCING WASTE, EMISSIONS, AND OTHER RELEASES. WE UNDERSTAND THAT IT IS A PRIVILEGE TO CONDUCT OUR BUSINESS IN THE COMMUNITIES WHERE WE OPERATE.

### Corporate Citizenship:

**We obey the law.**

WE ARE COMMITTED TO PROMOTING SUSTAINABLE SOCIAL AND ECONOMIC BENEFITS WHEREVER WE OPERATE.

### Honesty & Respect:

**We tell the truth and respect others.**

WE UPHOLD HIGH STANDARDS OF BUSINESS ETHICS AND INTEGRITY, ENFORCE STRICT PRINCIPLES OF CORPORATE GOVERNANCE, AND SUPPORT TRANSPARENCY IN ALL OUR OPERATIONS. ONE OF OUR GREATEST ASSETS IS OUR REPUTATION FOR ACTING ETHICALLY IN THE INTEREST OF EMPLOYEES, SHAREHOLDERS, CUSTOMERS, BUSINESS PARTNERS, AND THE COMMUNITIES WHERE WE OPERATE.

### Continuous Improvement:

**We must continually improve.**

INNOVATION AND HIGH PERFORMANCE ARE OUR WAY OF LIFE. WE BELIEVE A POSITIVE ATTITUDE TOWARD CONSTRUCTIVE CHANGE IS ESSENTIAL.

Reference Charts



TABLE V: ISO VISCOSITY GRADES

Viscosity System Grade Identification	Mid-Point Viscosity cSt (mm <sup>2</sup> /s)* @ 40°C	Approx. Viscosity SUS@100°F
ISO VG 10	10	60
ISO VG 15	15	75
ISO VG 22	22	105
ISO VG 32	32	150
ISO VG 46	46	215
ISO VG 68	68	315
ISO VG 100	100	465
ISO VG 150	150	700
ISO VG 220	220	1000
ISO VG 320	320	1500
ISO VG 460	460	2150
ISO VG 680	680	3150
ISO VG 1000	1000	4650
ISO VG 1500	1500	7000

\* The metric unit for viscosity is the millimeter squared per second. It is numerically the same as the centistoke (cSt)



TABLE IV: VISCOSITY EQUIVALENTS

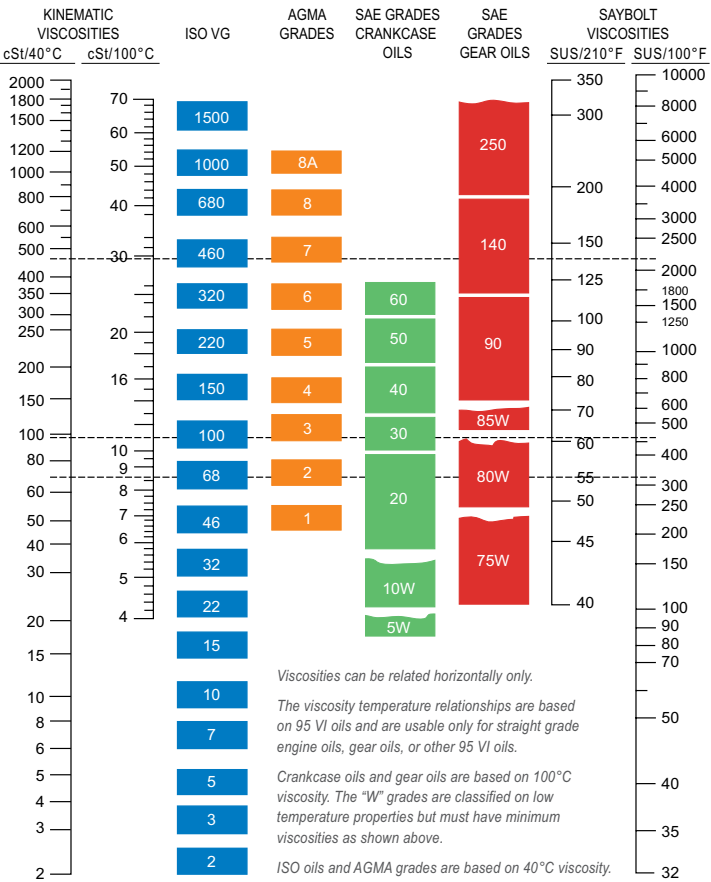


TABLE IV: GREASE COMPATIBILITY CHART

	Aluminum Complex	Barium	Calcium	Calcium 12-hydroxy	Calcium Complex	Bentone (Clay)	Lithium	Lithium 12-hydroxy	Lithium Complex	Polyurea	Sodium (Soda Base)
Aluminum Complex	Compatible	Incompatible	Incompatible	Compatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible
Barium	Incompatible	Compatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible
Calcium	Incompatible	Incompatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible
Calcium 12-hydroxy	Compatible	Compatible	Compatible	Compatible	Borderline	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible
Calcium Complex	Incompatible	Incompatible	Incompatible	Incompatible	Compatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible
Bentone (Clay)	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Compatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible
Lithium	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible
Lithium 12-hydroxy	Incompatible	Incompatible	Incompatible	Compatible	Incompatible	Incompatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible
Lithium Complex	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Compatible	Compatible	Incompatible	Incompatible
Polyurea	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Compatible	Incompatible
Sodium (Soda Base)	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Compatible





HOLLYFRONTIER REFINING & MARKETING  
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