

OIL & GAS • ADVANCED OXIDATION

Down-Hole Solutions for Oil & Gas Production

DZ 9450 / DZ 9966 mineral oxychloride generates reactive oxygen species (ROS) — ozone-class oxidation power in a bottle — to control H₂S and sour gas, treat produced water, dissolve iron sulfide, suppress paraffin and asphaltene, and lift output from tired and stripper wells.

**33.5**

EST. BBL/DAY, DZ 9450 WELL VS.
19.5 CONTROL

4 hrs

TREATMENT TIME VS. 4–7 DAYS
CONVENTIONAL

\$9,600

MATERIAL COST VS. \$11,100
CONVENTIONAL

— The Challenge Down Hole

Hydrogen sulfide, bacteria and mineral scale quietly rob wells of production and destroy equipment. When H₂S exceeds 10 ppmv in the gas phase, a well is deemed *sour* — demanding costly precautions in production, transport and storage because of toxicity, corrosion, formation plugging and rising sulfur content in the produced oil.

Iron sulfide deposits block pores, seed biofilm and drive corrosion, causing loss of injectivity. Sulfate-reducing bacteria regenerate H₂S and biofilm that supports scale, while paraffin and asphaltene build sticky deposits that choke flow. Conventional programs answer each problem with a separate chemical — scale inhibitor, acid, biocide — over four to seven days of downtime.

DZ 9450 addresses all of these at once. As a highly soluble oxidizer it reacts quickly with both organic and inorganic contaminants, acting as biocide, scale inhibitor, H₂S inhibitor and iron-sulfide inhibitor in a single, environmentally safe treatment applied in hours rather than days.

Instant results and improved oil-well production within marketable days of use — with bacteria, pathogens and paraffin managed on a simple maintenance schedule.

DZ 9450 down-hole application overview

— The Oxidation Advantage

DZ 9450 takes a simple oxygen molecule and shifts its valence, creating an unstable oxygen species that evolves into singlet oxygen and hydroxyl-radical ions — the same chemistry that makes ozone so powerful, but produced with a low-cost technology in an environmentally safe format at room temperature.

The technology simply controls the oxidative energy in water, measured in millivolts (mV). Studies by the WHO and the Ozone Institute show that raising the oxidation-reduction potential (ORP) above +650 mV eliminates harmful microorganisms in less than 10 seconds.

At roughly 2.8–2.9 V, mineral oxychloride sits alongside the hydroxyl radical and just below fluorine — far above chlorine (1.36 V) and ozone (2.07 V) — delivering advanced-oxidation performance without the hazards of dissolving a gas in water.

OXIDATION POTENTIAL OF COMMON OXIDANTS

REAGENT	FORMULA	VOLTS
Fluorine	F ₂	3.06
Mineral Oxychloride	M _x O _y Cl _z	2.8–2.9
Hydroxyl Radical	OH•	2.80
Oxygen Ion	O ⁻	2.42
Ozone	O ₃	2.07
Hydrogen Peroxide	H ₂ O ₂	1.78
Perhydroxyl Radical	HO ₂	1.70
Chlorine Dioxide	ClO ₂	1.57
Hypochlorous Acid	HOCl	1.49
Chlorine Gas	Cl ₂	1.36
Oxygen (Molecule)	O ₂	1.23
Hypochlorite Ion	OCl ⁻	0.94
Sodium Hypochlorite	NaOCl	0.94
Hydroperoxide Anion	HO ₂ ⁻	-0.88
Superoxide Radical	O ₂ ⁻	-2.40

— Hydrogen Sulfide & Sour Gas

DZ 9450 is highly effective at removing hydrogen sulfide, carbon dioxide and nitrogen compounds. At a ratio of 2 ppm H₂S to 1 ppm DZ 9450, it raises the ORP from -150 mV to +50 mV — enough to eliminate **all forms of hydrogen sulfide and mercaptan in a liquid or gas phase**.

By oxidizing sulfide chemistry at the source, DZ 9450 curbs the corrosion, formation plugging and toxicity that make sour wells expensive to operate — and lowers the sulfur content carried through into the produced oil.



Before and after — produced-water jar samples treated with DZ 9450.

H ₂ S CONTROL (2:1 RATIO)	BEFORE	AFTER DZ 9450
Oxidation-reduction potential	-150 mV	+50 mV
H ₂ S & mercaptan (liquid/gas)	Present	Eliminated

PRODUCED-WATER TREATMENT

Effective in treating produced water from fracking operations — removing hydrogen sulfide, iron and manganese, and breaking oil-water emulsions so the water “breaks easy in the gun barrel.”

— Field Applications

Iron-sulfide control. DZ 9450 oxidizes iron sulfide to iron oxide. Iron sulfide in oil and gas production forms deposits that damage the formation and equipment, cause loss of injectivity, block pores, seed biofilm and drive corrosion — all reversed by oxidation.

Biofilm & bacteria. The treatment eradicates aerobic and anaerobic bacteria and lowers HPC to non-detect levels. By eliminating the biofilm that supports scale formation, it prevents scale at the source: *no biofilm, no scale*.

Paraffin & asphaltene. DZ 9450 minimizes the impact of paraffin and asphaltenes, working like a pour-point suppressant by modifying the surface charge so the two cannot form a sticky deposit.

Corrosion & scale. Acting as biocide, scale inhibitor and H₂S / iron-sulfide inhibitor in one, it protects tubing, pumps and the formation without a multi-step acid-and-inhibitor program.

SINGLE-PRODUCT COVERAGE

Hydrogen sulfide	Oxidized
Iron sulfide	→ iron oxide
Biofilm	Eliminated
Aerobic/anaerobic bacteria	Eradicated
HPC	Non-detect
Paraffin / asphaltene	Suppressed
Scale	Prevented



— Pecos County Stimulation — Treatment Program

PARAMETER	CONVENTIONAL PROGRAM	PROPOSED — DZ 9450
Completion time	4–7 days	4 hours
Chemistry	10 BBL scale inhibitor (EDTA/NTA), 2×1,000 gal HCl acid, 50 BBL chlorine dioxide, 310 BBL water	550 gal DZ 9450 mixed into 300 BBL water, dosed 1–5%
Handling risk	Acid + ClO ₂ (explosive >30%; OSHA PEL 0.1 ppm)	Environmentally safe, easy to use
Material cost	\$11,100	\$9,600

Data from oil-well stimulation study, Pecos County, Texas — June 2016.

— Side-by-Side Well Results

Wells No. 10 and No. 12 in Pecos County, Texas served as adjacent test sites. Well No. 12 received the conventional program; Well No. 10 was stimulated with DZ 9450 — two 275-gallon totes pumped down hole in 4 hours by 2 operators, then sealed overnight.

OUTPUT (BBL PER 12 HRS)	WELL 12 — CONTROL	WELL 10 — DZ 9450
Day 1 — baseline	0.5	1
Post-treatment peak	40	45
Day 10	29	39 (avg)
Day 20 — holding	25	30
Bottle test (ABS)	<10K CFU	<1K CFU
Estimated barrels per day	19.5	33.5 +72%

Estimated bbl/day = cumulative 12-hr output over 20 days ÷ 20. Control: $390 \div 20 = 19.5$; DZ 9450: $671 \div 20 = 33.5$.

— Stripper & Tired Wells

The DZ 9450 well moved from barely 1 bbl per 12 hours to a peak of 45 bbl and held near 30 — a 72% higher estimated daily output than the control, at lower material cost and in a fraction of the time. Cleaner produced water (ABS consistently <1K CFU) and reduced paraffin followed.

On a simple maintenance schedule, DZ 9450 keeps bacteria, pathogens, H₂S and paraffin in check — sustaining production from stripper and marginal wells that conventional programs make uneconomic to service.



DZ 9450 — a mineral oxidizer for the 21st century.

Eliminates H₂S & Mercaptan

Iron Sulfide → Iron Oxide

Biofilm & Scale Control

Environmentally Safe

TALK TO US ABOUT A DOWN-HOLE TRIAL

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