Gravity Concentrates

Metallurgical Performance

Category	RZOLV™ Hydromet Leaching	Smelting Treatment
Gold Liberation Mechanism	Direct chemical oxidation & complexation at low pH; rapidly dissolves free gold and electrum typically found in gravity products.	High-temperature fusion (>1,000°C) to melt gold and gangue.
Effect on Clean, High-Grade Feeds	Extremely efficient; gravity gold dissolves rapidly with minimal reagent consumption.	High performance but costly; treatment charges still apply regardless of simplicity.
Effect on Heavy Mineral / Black Sand Fractions	Stable kinetics even with magnetite/ilmenite; no penalty for iron or silica.	Silica/iron impurities generate slag → higher flux consumption and smelter deductions.
Kinetic Behavior	Very fast dissolution; ORP 150–350 mV; typical dissolution in hours.	Immediate melting but energy-intensive and throughput-limited.
Passivation Issues	Minimal; reagent maintains active surface chemistry.	Occasional encapsulation of fine gold in slag; losses increase with black sands.
Recovery Potential	98–99%+ achievable on gravity gold and table tails.	92–98% payable depending on purity and contract terms.

Economic Considerations

Category	RZOLV™	Smelter
Payability	~99%+ direct on-site recovery with zero contract deductions.	90–98% depending on fluxing requirements and impurity penalties.

Treatment Charges (TC)	None.	$150–$400+/t depending on purity.
Refining Charges (RC)	None.	2–4% of gold value.
Penalty Elements	No penalties regardless of iron, silica, titanium, or magnetite content.	Penalties for silica, copper, iron, lead, and tramp elements → higher slag volume.
Moisture/Assay Losses	None; leach in slurry on-site.	Common; moisture adjustments + assay settlement variances.
Shipping & Insurance	None; processed on-site.	$150–$450/t depending on location and insurance.
Working Capital Lag	Hours–days (immediate electrowinning/carbon strip).	2–6 months until final settlement.
OPEX Impact	Very low; reagent regenerable and tailored for clean feeds.	High; smelting cost stack increases with slag demand and impurity profile.

Environmental & Operational Factors

Category	RZOLV™	Smelter
Emissions	Zero SO_2, zero particulate/metal emissions.	SO_2, NOx, and heavy-metal-bearing particulates.
Residue Profile	Low-toxicity leach residue; manageable under standard environmental regulations.	High-temperature slags classified as potentially hazardous.
Permitting	Generally straightforward; water-based chemistry.	Complicated; smelters face strict air-emission regulations.
Operational Control	Full on-site control; immediate metallurgical feedback.	Entirely dependent on third-party smelter schedules/acceptance.
Risk	Low ESG and community risk.	High environmental, ESG, and logistical risk.

Executive Summary (Technical & Economic)

Processing **gravity concentrates** with **RZOLV™** provides:

- **Higher gold payability** with ~99–100% on-site metal recovery and **no contract deductions**
- **No penalties** for silica, iron, black sand minerals, or minor impurities
- **Elimination of smelter TCs, RCs, shipping, insurance, and multi-month settlement delays**
- **Zero emissions** and no hazardous slag generation
- **Fast leach kinetics**, even for fine gold locked in heavy-mineral fractions
- **Immediate cash flow**, with gold recovered directly through carbon or electrowinning
- **Operational independence**, no reliance on smelter schedules or acceptance criteria

RZOLV™ converts gravity concentrates—traditionally shipped, penalized, and delayed—into an immediate, on-site, high-value hydrometallurgical product with maximum gold realization.