

## Thermochem 2021 Prices List Consulting, Laboratory and Field Services

### Personnel Rates, Project site (international or domestic)

<b>Senior Chemical Engineer / Process Chemist</b>	US\$/day	\$	<b>3,000.00</b>
<b>Senior Geochemist</b>	US\$/day	\$	<b>2,500.00</b>
<b>Chemical Engineer / Geochemist</b>	US\$/day	\$	<b>2,400.00</b>
<b>Senior Field Chemist</b>	US\$/day	\$	<b>2,500.00</b>
<b>Field or Lab Chemist</b>	US\$/day	\$	<b>2,000.00</b>
<b>Field or Lab Technician</b>	US\$/day	\$	<b>1,800.00</b>
<b>Travel Expenses</b> For on-site services or travel as required (other than mileage)	US\$/trip		<b>at cost + 15%</b>
<b>Mileage</b> Field Service Truck to site (4WD Utility truck, Van or SUV)	US\$/mile	\$	<b>1.75</b>
<b>Travel Time</b> For on-site services or travel as required.	US\$/day		<b>1/2 Daily Rate</b>
<b>General Field Equipment Rate, Project site</b> (domestic) Two-phase sampling separator (ASTM E-1675) Non-isokinetic sample probes, condenser/coolers, high-pressure Teflon hose NIST-traceable digital temperature and pressure instrumentation, field analyzers Tools, pipe fittings, supplies; Utility truck, Van or SUV (+ mileage)	US\$/day	\$	<b>2,975.00</b>

### Consulting Services, Thermochem or Client Offices (international or domestic)

<b>Senior Chemical Engineer / Process Chemist</b>	US\$/hour	\$	<b>375.00</b>
<b>Senior Geochemist</b>	US\$/hour	\$	<b>315.00</b>
<b>Chemical Engineer / Geochemist</b>	US\$/hour	\$	<b>300.00</b>
<b>Senior Field Chemist</b>	US\$/hour	\$	<b>315.00</b>
<b>Field or Lab Chemist</b>	US\$/hour	\$	<b>250.00</b>
<b>Field or Lab Technician</b>	US\$/hour	\$	<b>225.00</b>
<b>Data Processing/MIS</b>	US\$/hour	\$	<b>175.00</b>

**Laboratory Analysis Services**

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<b>General Steam Condensate Analysis</b> Na, Cl, B, SiO <sub>2</sub> , pH	US\$/sample	\$	<b>460.00</b>
<b>Comprehensive Steam Condensate Analysis</b> Na, Cl, B, SiO <sub>2</sub> , As, Hg, Fe, pH	US\$/sample	\$	<b>630.00</b>
<b>Comprehensive Steam Condensate Analysis, less Hg</b> Na, Cl, B, SiO <sub>2</sub> , As, Fe, pH	US\$/sample	\$	<b>595.00</b>
<b>Steam Purity Analysis-</b> Na, Ca, Cl, B, SiO <sub>2</sub> , Fe, TDS (calc)	US\$/sample	\$	<b>550.00</b>
<b>Steam Quality and Separator Efficiency Analysis</b> Liquid Tracer Analysis	US\$/sample	\$	<b>225.00</b>
<b>Total Noncondensable Gas Analysis</b> Ar, O <sub>2</sub> , N <sub>2</sub> , CH <sub>4</sub> , H <sub>2</sub> , CO <sub>2</sub> , NH <sub>3</sub> , H <sub>2</sub> S, Total NCG	US\$/sample	\$	<b>795.00</b>
<b>Limited Gas Analysis</b> Residual Gas (PVT) CO <sub>2</sub> , NH <sub>3</sub> , H <sub>2</sub> S, Total NCG	US\$/sample	\$	<b>575.00</b>
<b>Hydrocarbon Scan Analysis</b> C1 - C6 Hydrocarbons	US\$/sample	\$	<b>975.00</b>
<b>BTXE Scan Analysis</b> Benzene, Toluene, Xylene, Ethylbenzene	US\$/sample	\$	<b>575.00</b>
<b>Benzene Analysis</b> C <sub>6</sub> H <sub>6</sub> only	US\$/sample	\$	<b>350.00</b>
<b>Carbon Monoxide Analysis</b> CO	US\$/sample	\$	<b>475.00</b>
<b>Sulphur Dioxide Analysis</b> SO <sub>2</sub> in absorbing solution	US\$/sample	\$	<b>375.00</b>
<b>Radon-222 Gas Analysis</b> Rn-222 in Steam, Gas, or Water	US\$/sample	\$	<b>475.00</b>
<b>Stable Isotope Analysis</b> Deuterium, Oxygen 18	US\$/sample	\$	<b>200.00</b>
<b>Tritium Analysis</b> Enrichment and low level counting	US\$/sample	\$	<b>750.00</b>
<b>General Water Analysis-(A)</b> Na, K, Ca, Mg, Li, B, SiO <sub>2</sub> , Cl, SO <sub>4</sub> , HCO <sub>3</sub> , CO <sub>3</sub> , NH <sub>3</sub> , pH, TDS(calc)	US\$/sample	\$	<b>635.00</b>
<b>General Water Analysis-(B)</b> Na, K, Ca, Mg, Fe, B, SiO <sub>2</sub> , Cl, SO <sub>4</sub> , HCO <sub>3</sub> , CO <sub>3</sub> , pH, TDS(calc)	US\$/sample	\$	<b>620.00</b>
<b>Comprehensive Water Analysis</b> Na, K, Ca, Mg, Li, Sr, Ba, Fe, Mn, Al, As, Sb, B, SiO <sub>2</sub> , Cl, F, SO <sub>4</sub> , HCO <sub>3</sub> , NH <sub>3</sub> , H <sub>2</sub> S, CO <sub>2</sub> , pH, TDS(calc)	US\$/sample	\$	<b>875.00</b>

## Laboratory Analysis Services

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<b>Exploration Water Analysis</b> Na, K, Ca, Mg, Li, Rb, Cs, As, B, SiO <sub>2</sub> , Cl, F, SO <sub>4</sub> , HCO <sub>3</sub> , NH <sub>3</sub> , pH, TDS (calc)	US\$/sample	\$	<b>800.00</b>
<b>Helium Isotope Analysis</b> He isotope ratios (R, Ra) Noble gases	US\$/sample	\$	<b>725.00</b>
<b>Elemental Analysis of Solids by XRF</b> SiO <sub>2</sub> , Ag, Al, As, B, Ba, Ca, Cd, Cr, Cu, Fe, Hg, K, Li, Mg, Mn, Mo, Na, Ni, Pb, S, Sb, Se, Sr, Ti, V, Zn	US\$/sample	\$	<b>450.00</b>
<b>Solid Sample X-Ray Analysis</b>	US\$/sample	\$	<b>575.00</b>
<b>High-Resolution XRD</b>	US\$/sample	\$	<b>995.00</b>
<b>Scanning Electron Microscopy (SEM/EDX)</b> Surface analysis and elemental composition	US\$/sample	\$	<b>995.00</b>
<b>X-Ray Fluorescence</b> 31 element scan	US\$/sample	\$	<b>265.00</b>
<b>Isopentane, Pentane, Isobutane , Butane Analysis</b>	US\$/sample	\$	<b>405.00</b>
<b>Hydrofluorocarbon Reservoir Tracer Gas Analysis</b> Two Tracers in Same Sample	US\$/sample US\$/sample	\$ \$	<b>425.00</b> <b>575.00</b>
<b>Perfluorocarbon Reservoir Tracer Gas Analysis</b> Includes Low-level Concentration Step Up to 2 PFC tracers analyzed in the same sample	US\$/sample	\$	<b>425.00</b>
<b>Alcohol (Isopropanol, n-Propanol, n-Butanol) Reservoir Tracer Analysis</b> Includes Low-level Concentration Step Up to 3 low-level alcohol tracers analyzed in the same sample	US\$/sample	\$	<b>550.00</b>
<b>Sulphur Hexafluoride Production Gas Tracer Analysis</b> SF <sub>6</sub> in Gas or Steam	US\$/sample	\$	<b>315.00</b>
<b>ThermoTrace Production Liquid Tracer Analysis</b> TT in Brine or Condensate	US\$/sample	\$	<b>225.00</b>
<b>Low-level analysis of Naphthalene Sulfonate Tracers</b>			
1 - 2 of above Tracers per Sample	US\$/sample	\$	<b>345.00</b>
3 - 4 of above Tracers per Sample	US\$/sample	\$	<b>375.00</b>
5 - 6 of above Tracers per Sample	US\$/sample	\$	<b>425.00</b>
7 - 8 of above Tracers per Sample	US\$/sample	\$	<b>450.00</b>
Extraction prep for concentration and matrix clean-up (Determination for extraction step based on background sample analysis)	US\$/sample	\$	<b>175.00</b>
Additional runs to quantitate all tracers in one sample, if present at greatly different concentrations.	US\$/sample	\$	<b>115.00</b>

**Individual Species Analysis** (alone or added to group analysis)

Chloride Analysis by IC (trace level IC, incl. prep)	US\$/sample	\$	175.00
Chloride Analysis in brine (titration)	US\$/sample	\$	75.00
Other Anions by IC (F, Br, NO <sub>3</sub> , SO <sub>4</sub> , S <sub>2</sub> O <sub>3</sub> , per analyte)	US\$/sample	\$	110.00
Major Metals in water, condensate or brine by AAS or ICP (Na, K, Ca, Mg, Li, Sr, Cs, Rb, SiO <sub>2</sub> , B; per analyte)	US\$/sample	\$	85.00
Trace Metals in water, condensate or brine by ICP (Fe, Mn, As, Sb, Zn, etc; per analyte)	US\$/sample	\$	100.00
Major or Trace Metals on gas/water filters by AAS or ICP (per analyte, incl. prep)	US\$/sample	\$	265.00
Total Mercury	US\$/sample	\$	210.00
pH, EC Analysis (per analyte)	US\$/sample	\$	25.00
TDS, TSS, TS Analysis (per analyte)	US\$/sample	\$	145.00
Alkalinity Analysis	US\$/sample	\$	110.00
Total Inorganic Carbon Analysis in water or brine	US\$/sample	\$	100.00
NH <sub>3</sub> Analysis in water, condensate or brine	US\$/sample	\$	100.00
NH <sub>3</sub> Analysis in gas scrubbing bottles (2 impingers)	US\$/sample	\$	325.00
H <sub>2</sub> S Analysis in water, condensate or brine	US\$/sample	\$	110.00
H <sub>2</sub> S Analysis in gas scrubbing bottles (2 impingers)	US\$/sample	\$	325.00
Low-level H <sub>2</sub> S Analysis in condensate or brine (0.05 mg/kg - 5 mg/kg)	US\$/sample	\$	350.00
Asbestos Analysis in water, condensate or brine	US\$/sample	\$	325.00
Oil & Grease Analysis	US\$/sample	\$	125.00
Gross Alpha & Gross Beta Analysis	US\$/sample	\$	325.00
Vinyl Chloride Analysis	US\$/sample	\$	325.00
High TSS Sample Prep / Filtration Charge (per sample bottle / aliquot)	US\$/sample	\$	225.00

**Rush Fees** (depends on lab availability):

**ASAP Rush - 100%** (less than 1 week)

**1 Week Rush - 50%**

**2 Week Rush - 25%**

IC = Ion Chromatography

AAS = Atomic Absorption Spectroscopy

ICP = Inductively Coupled Plasma Spectroscopy (includes ICP/MS, mass spectroscopy)

## Field Testing Services

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### Production Well Sampling

<b>Single-Phase Production Wells/Pipelines- Direct</b> Direct tap sampling with bleed tee for steam	US\$/location	\$	<b>300.00</b>
<b>Single-Phase Production Wells/Pipelines- Probe</b> Non-isokinetic probe sampling with temperature measurement for saturation superheat determination	US\$/location	\$	<b>385.00</b>
<b>Wet or Two-Phase Production Wells/Pipelines</b> Two-phase mini-separator sampling according to ASTM E-1675	US\$/location	\$	<b>950.00</b>
<b>Isokinetic Steam Sampling for Steam Purity</b> 6-point isokinetic traverse of pipelines, with temperature measurement at each point for saturation or superheat. Samples collected for direct analysis of impurities	US\$/test	\$	<b>4,750.00</b>
<b>Mobilization charge for less than 2 tests</b> (except The Geysers)	US\$	\$	<b>4,500.00</b>
<b>Steam Wash Optimization Field Testing Services</b> Steam Scrubber Mass Balance and Efficiency Test, Including Steam Quality and Purity Sample Collection (not including lab analysis)	US\$/test	\$	<b>18,500.00</b>
<b>Mobilization charge for less than 2 tests</b> (except The Geysers)	US\$	\$	<b>4,500.00</b>

**Note:** Field services do not include travel time / expenses, or additional personnel and equipment when required.

## Tracer Testing Services

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### Reservoir Tracer Testing Services

<b>Low-Pressure Vapor Tracer Injection</b> Vapor Tracer metered using computer interfaced to electronic balance for precise feed rate control (up to 250 kg of liquefied vapour tracer per well, WHP must be reduced to 10 psig or less)	US\$/well	\$	<b>5,500.00</b>
<b>Mobilization charge for less than 2 wells</b> (except The Geysers)	US\$	\$	<b>3,000.00</b>
<b>Low-Pressure Liquid Tracer Injection</b> Liquid Tracer mixed on-site and injected (up to 200 kg of dry chemical tracer per well, WHP must be reduced to 10 psig or less)	US\$/well	\$	<b>12,500.00</b>
<b>High-Pressure Liquid Tracer Injection</b> Liquid Tracer mixed on-site and injected (up to 200 kg of dry chemical tracer per well, WHP up to 500 psig)	US\$/well	\$	<b>25,000.00</b>
<b>Mobilization charge for less than 2 injection wells</b>	US\$	\$	<b>7,500.00</b>
<b>Tracer-Based Mass Flowrate and Enthalpy Measurement</b> (Includes lab tracer analyses)			
<b>Single-Phase Production Wells/Pipelines-</b> Includes mass flowrate determination of steam or brine and sampling for geochemistry. Injection pressures up to 750 psig.	US\$/test	\$	<b>4,000.00</b>
<b>Two-Phase Production Wells/Pipelines-</b> Includes mass flowrate determination of steam and brine, total mass flowrate, total fluid enthalpy and mini-separator sampling of steam and brine for geochemistry. Injection pressures up to 750 psig.	US\$/test	\$	<b>5,000.00</b>
<b>High-Pressure Single-Phase Production Wells/Pipelines-</b> Includes mass flowrate determination of steam or brine and sampling for geochemistry. Injection pressures up to 3750 psig.	US\$/test	\$	<b>9,500.00</b>
<b>High-Pressure Two-Phase Production Wells/Pipelines-</b> Includes mass flowrate determination of steam and brine, total mass flowrate, total fluid enthalpy and mini-separator sampling of steam and brine for geochemistry. Injection pressures up to 3750 psig.	US\$/test	\$	<b>12,500.00</b>
<b>Minimum charge 5 tests or additional mobilization fees may apply</b>			

**Note:** Field services do not include travel time / expenses, or additional personnel and equipment when required.

**Downhole Testing Services****Wellbore Sampling and Logging**

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<b>High-Temperature Downhole Sampler - PT Logging Tool</b>	US\$/run	\$	<b>17,500.00</b>
For Steam, Brine or Two-Phase Sampling with PT log. Does not include on-site consulting, operation, hoisting or lab analysis. (2 Thermochem Engineers or Chemists required on-site) Requires guarantee for loss or damage in well up to \$95,000			
<b>High-Temperature Downhole Sampler - PTS Logging Tool</b>	US\$/run	\$	<b>20,000.00</b>
For Steam, Brine or Two-Phase Sampling with PTS log. Does not include on-site consulting, operation, hoisting or lab analysis. (2 Thermochem Engineers or Chemists required on-site) Requires guarantee for loss or damage in well up to \$95,000			
<b>Mobilization charge for less than 2 tests</b>	US\$	\$	<b>17,500.00</b>

**Note:** Field services do not include travel time / expenses, or additional personnel and equipment when required.

## Other Miscellaneous Services

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<b>Gas Bottle Preparation Fee</b> For each bottle received by customer	US\$/each	\$	<b>85.00</b>
<b>Gas Bottle Deposit and Replacement Cost</b>	US\$/each	\$	<b>260.00</b>
<b>Water and Condensate Sample Bottle Preparation Fees</b>			
60 ml plastic, no preservative	US\$/each	\$	<b>3.50</b>
125 - 250 ml plastic, no preservative	US\$/each	\$	<b>5.00</b>
500 - 1000 ml plastic, no preservative	US\$/each	\$	<b>11.00</b>
125 - 500 ml plastic, dilute HNO <sub>3</sub> , pre-weighed	US\$/each	\$	<b>20.00</b>
125 - 250 ml plastic, dilute HNO <sub>3</sub> / DI (SiO <sub>2</sub> dilution), pre-weighed	US\$/each	\$	<b>26.50</b>
125 - 250 ml plastic, 5XForm-Cd (SO <sub>2</sub> ), pre-weighed	US\$/each	\$	<b>26.50</b>
125 ml plastic or glass, HNO <sub>3</sub> / K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> (Hg), pre-weighed	US\$/each	\$	<b>33.50</b>
500 - 1000 ml plastic, Cd/NaOH (H <sub>2</sub> S), pre-weighed	US\$/each	\$	<b>33.50</b>
500 - 1000 ml glass impinger, Cd/NaOH (H <sub>2</sub> S), pre-weighed	US\$/each	\$	<b>47.00</b>
500 - 1000 ml glass impinger, HNO <sub>3</sub> / K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> (Hg), pre-weighed	US\$/each	\$	<b>47.00</b>
500 - 1000 ml glass impinger, H <sub>2</sub> SO <sub>4</sub> (NH <sub>3</sub> ), pre-weighed	US\$/each	\$	<b>47.00</b>
<b>Disposable Sample Filter Apparatus</b>			
60 ml Plastic Syringe for Filtration	US\$/each	\$	<b>4.50</b>
Disposable Syringe Filter Disks	US\$/each	\$	<b>7.00</b>
In-line Filter Disk	US\$/each	\$	<b>27.50</b>
High-Capacity In-line Filter Cartridge	US\$/each	\$	<b>78.50</b>
<b>Helium Isotope Collection Tube</b> Cu tube with clamps and support rack	US\$/each	\$	<b>165.00</b>
<b>Hazardous Material Packing and IATA Documentation</b> (Gas Bottles)	US\$/package	\$	<b>925.00</b>
<b>Hazardous Material Packing and IATA Documentation</b> (Water Bottles)	US\$/package	\$	<b>725.00</b>
<b>Hazardous Material IATA Documentation</b> (paperwork only, per package)	US\$/package	\$	<b>300.00</b>
<b>Non-Hazardous Material Packing and Documentation</b> (Fiberboard box + inner packings)	US\$/package	\$	<b>175.00</b>
<b>Import / Export Documentation</b> (paperwork only, per package)	US\$/hour	\$	<b>275.00</b>
<b>Custom Wooden Crating</b> (heat treated and stamped)			<b>quote</b>

**Note:** Prices for any services not covered by current contracts or quotes are subject to change without notice.