Guidance for Clients: ICP-OES vs. ICP-MS – What to Choose?

Aspect	ICP-OES (Thermo iCAP Pro)	ICP-MS (Analytic Jena PQ MS Elite)
What It Does Best	Measures elements at higher concentrations (ppm to ppb range) quickly and reliably.	Detects ultra-trace levels of elements (ppt range) with high precision.
Sample Types	Great for environmental (soil, water, wastewater), pharma (quality control), and alloys.	Ideal for environmental (drinking water), pharma (trace impurities), and alloys (low-level elements).
Detection Limits	Detects elements down to parts per billion (ppb); good for most routine needs.	Detects elements down to parts per trillion (ppt); best for very low concentrations.
Speed	Fast—analyzes many elements in multiple samples per hour.	Slower—takes longer per sample due to detailed analysis, but still efficient for traces.
Element Range	Covers a wide range of elements (metals and some non-metals) simultaneously.	Covers nearly all elements, including rare ones, and can distinguish isotopes.
Sample Tolerance	Handles tough samples (high salts, solids, or complex mixtures) with less preparation.	Needs cleaner samples (low salts/solids) and often more preparation to avoid issues.
Advantages	Fast and cost-effective for routine testing. **Works well with messy or concentrated samples**. Easy to use for broad checks.	Super sensitive for tiny amounts of elements. **Great for strict regulatory limits**. Can identify specific forms (isotopes) of elements.
Limitations	Not sensitive enough for ultra-low levels (e.g., trace toxins). **Can't separate isotopes.**	Struggles with high-salt or solid-heavy samples. **More complex and costly to run**.
Best For	General checks on water quality, alloy composition, or pharma purity at moderate levels.	Ultra-trace analysis like toxic metals in drinking water or rare elements in alloys.
Cost Consideration	Lower cost per sample—good for high-volume testing.	Higher cost per sample—worth it for precision at trace levels.

To Summarize:

- **Choose ICP-OES (Thermo iCAP Pro)** if you need quick, reliable results for samples with higher element concentrations (e.g., checking alloy quality, screening environmental contaminants, or ensuring pharma standards) and don't need ultra-trace detection.
- **Choose ICP-MS (Analytic Jena PQ MS Elite)** if your priority is detecting very tiny amounts of elements (e.g., trace toxins in drinking water, low-level impurities in drugs, or rare elements in alloys) or if you need to meet strict regulatory limits.