

## Inorganic analysis services: AGFS Analytical Services

### Sample preparation

Sample drying
Plant grinding
Soil grinding
Odd/Unusual Material grinding
Small sample grinding
Solution filtering
Solution acid stabilization
Grinding room use

### Extractions and digestions

Plant nitric-perchloric
Plant microwave (nitric only)
Plant microwave (including HF for silicon)
Plant/Soil acid leaching (for nitrate/ammonia, chloride)
Plant extraction - Phytate-P
Soil/Other digestion microwave (HF)
Soil/Other extraction - microwave acid
Soil extraction - Colwell Phosphorus
Soil extraction - KCl Nitrate/Ammonia
Soil extraction - NH <sub>4</sub> Cl ExCats
Soil Extraction - Silver-Thiourea ExCats
Soil Extraction - DTPA heavy metals
Soil Extraction - CMP Sulfur
Soil Extraction - CaCl <sub>2</sub> Boron
Soil Extraction - Mehlich-3 total elemental

### Instrument analysis

ICPOES - analysis for common 20 element suite in common matrix (Al, As, B, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mo, Mn, Na, Ni, P, Pb, S, Se, Zn)
ICPOES - unusual elements or matrices analysis, requiring preparation of standards
ICPOES - rare earth and precious metal analysis (eg gold, platinum, palladium)
ICPOES - analysis for common 10 element suite in common matrix – (Ca,Mg,K,Na,P,S,Cu,Mn,Fe,Zn)
ICPOES - analysis for Nitric/Perchloric Extr (Markers Co,Cr,Yb,La)
Discrete analysis: phosphate, ammonia, nitrate, nitrite and chloride
Leco combustion total C, Total N, protein

### Other analysis - Gravimetric / Colorimetric / Titrimetric

Gravimetric Moisture/water content
Gravimetric NDF Fibre, ash
Ash free NDF Fibre
Gravimetric ADF Fibre, cellulose, lignin, ash
Ash free ADF Fibre
Gravimetric Hemicellulose (both NDF & ADF)
Lignin
Gravimetric - Ash content only
Gravimetric Crude Fats - soxhlet
Gravimetric Crude Fats - Randall
Gravimetric Sulfate
Colorimetric - basic UV/Vis reading
Colorimetric Soil Microbial Biomass
Colorimetric Soluble Carbohydrates
Colorimetric Starch
Colorimetric Sol Carbs & Starch
Colorimetric Tannins
Colorimetric Polyphenols
Titrimetric Alkalinity
Titrimetric Sulfides
Soil pH-EC
Solution pH-EC
TOC/TN liquid analyser (usually >1000 samples)
NIR
Water analyses for Irrigation

- I. Moisture, ashing, pH and EC measurements can normally be done in other labs at St. Lucia, for less cost. Please check with the tech staff member for your discipline before consulting us.
- II. Large sample batches: 10% incremental discounts will be applied prior to billing

## Organic lab services: AGFS Analytical Services

### Sample preparation

Sample drying (nitrogen flow)

Sample drying (SpeedVac): rotor sizes: 1.5-2mL microcentrifuge tubes; 15mL centrifuge tubes; 50mL centrifuge tubes

Extraction once into liquid phase (basic)

Extraction twice into liquid phase (basic)

Multi-step extraction/solid Phase extraction

Filtration prior to GC or HPLC

### Chromatography assays (sample analysis ONLY, samples must be submitted ready for analysis; ASU generic columns)

#### Gas chromatography

Greenhouse Gases (FID/ECD)

GC - Gas injection (FID/TCD)

GC - Liquid injection (FID/TCD)

GCMS - Sample screen (Liquid/headspace injection/SPME sample injections; single quadrupole MS)

GCMS - Targeted compounds (single quadrupole MS)

#### Liquid chromatography

UHPLC – standard run (UV/VIS, fluorescence, RI and PDA)

UHPLC – standard run (ELSD)

LCMS untargeted

LCMS targeted

#### Ion chromatography: Mass Spectrometer

IC – cations and anions (CI and PDA)

### Chromatography method development / data processing / consult

Sample preparation

Instrument assay method development

Data processing

Other chromatography related consultation

- Minimum batch size for most assays are six injections (please include standards).
- Unit “per injection” means, ready-for-injection sample analysis. If one sample requires multiple injections, the number of injections are counted.
- Quotation for chromatography assays/projects will need to be determined on a case by case basis as samples are needs/requirements assessed. Considerations include: method development requirements, sample preparation needs, experimental design, batch submission design and post-data acquisition assistance.
- In order to perform analysis of specified compounds, particularly for one off requests, the service may recommend the purchase of other chemicals / standards, which we do not keep in stock. The purchase of these items will be at the cost of the requester.
- Chromatography results will be transferred as RAW DATA, unless stated in the enquiry raw data processing (chromatographic integrations and AUC export) is required. If ASU personnel is required to process the raw data, there will be a standard “consultation” charge will be added to the quotation. Basic software use training will be given for new users for 30mins.  
**NB: Training is not for chromatographic background and data analysis.**
- Large sample batches: 10% incremental discounts will be applied prior to billing

Routine chromatography assays listed subsequently

**NB: Please note with any chromatography methods there are modifications which may be required dependent on sample matrices or solvents.**

Instrument	Instrument method/compound class	List of tested stds	Extraction (suggested)	Sample prep (prior injection)
GHG-GC	CH4, N2O, CO2			equalisation, stds
GC-FID -Liq	Alcohols	Methanol, ethanol, isopropanol, n-propanol, tert-butanol, n-butanol, pentanol, isoamyl alcohol, 2-methyl-1-pentanol, 2-heptanol, 2-octanol, 2-ethyl-1-hexanol, 1-octanol		filter and dilute in acetone
	Ketones	acetone, methylethyl ketone, 2,3-butanedione, 4-methyl-2-pentanol, 2-methyl-3-hexanone, 2-heptanone, 2-octanone, cyclohexanone, 5-nonanone, 2-nonanone, 2-furaldehyde (furfural), 2-decanone, benzaldehyde, 2-undecanone		filter and dilute in ethyl acetate
	Volatile free acids	acetic acid, butyric, pentanoic, hexanoic, heptanoic, octanoic, nonanoic		filter and dilute in acetone
GC-FID/TCD -Gas	Ethylene	acetylene/ethylene		Acetylene reduction assay
GCMS	Liquid screening (no derivatisation)	extraction method dependent (polar - apolar compounds)		centrifuge, dry, dilute in organic solvent, filter
	SPME-HS screening	e.g. flavour volatiles (dairy, fruit, meat, bacterial volatiles, volatile fatty acids (SCFA), plant volatiles)		NA
	TMS metabolites	e.g. sugars, amino acids (not all classes), free FA, MAG, DAG, sterols	Protein precipitation, delipidation	oximation and silylation
	FAMES (C:6 - C:24)	37 component FAME mix	Bligh and dyer	transesterification
	Sterols	ergosterol, cholesterol, stigmasterol, sitosterol	hydrolysis	SPE Aminopropyl
Ion Chromatography	Cations - common	Li, Na, K, NH4, Ca, Mg, Fe, Zn	ion exchange/chelation	centrifuge, filter and dilute
	Cations - transition metals/alkaline earth metals	Co, Zn, Sr, Ba, Ca, Mg, Fe, Ni, Cu	ion exchange/chelation	centrifuge, filter and dilute
	Cations - speciation	Co(I)/(II), Fe(II)/(III), Cr(III)/(VI), Cu(I)/(II)	ion exchange/chelation	centrifuge, filter and dilute
	Anions - common	NO3, NO2, SO4, PO4, F, Cl, Br	ion exchange/chelation	centrifuge, filter and dilute
	Anions - halides	F, Cl, Br, I	ion exchange/chelation	centrifuge, filter and dilute
	Anion - speciation	NO2/NO3, SO3/SO4, Br/BrO4	ion exchange/chelation	centrifuge, filter and dilute
UHPLC	Sugars (ELSD)	xylose, fructose, glucose, sucrose, maltose, maltotriose, arabinose, mannose, galactose, lactose	water	centrifuge, filter and dilute
	Sugar aditols (pmp derivatisation; PDA)	ramnose, fucose, arabinose, xylose, mannose, galactose, ribose, deoxyribose, glucose, galacturonic acid, glucuronic acid	as per protocol	PMP derivatisation
	Water soluble vitamins (PDA)	Bs, C	dissolve/dilute in water	SPE MCX
	Fat soluble vitamins (PDA)	A, D2, D3, K2 (MK4), K2 (MK7), E	hexane extraction (matrix dependent additions)	SPE Aminopropyl
	Organic acids (PDA)	oxalic, citric, tartaric, malic, malonic, succinic, formic, acetic, fumaric, butyric	water	centrifuge, filter and dilute
	Salicylic acids (PDA)	TRI protocol	alcohol extraction	SPE HLB PRiME
	Phenolic acids (PDA)	gallic, gentisic, chlorogenic, caffeic, vanillic, homovanillic, syringic, p-coumaric, ferulic, sinapinic, o-coumaric, ellagic, trans-cinnamic	alcohol extraction	SPE HLB PRiME
	Flavonoids (PDA)	catechin, mangiferin, rutin, myricetin, quercetin, kaempferol, apigenin, naringenin, chrysin, flavone, pinocembrin	alcohol extraction	SPE HLB PRiME
	17 common amino acids (FMOC derivatisation; FLD)	20 amino acids (minus tryptophan, histidine, lysine, cysteine) plus ornithine	matrix dependent	FMOC derivatisation
	Auxins (PDA)	tryptophan (TRP), histidine, tyrosine, indole-acetic acid (IAA), hydroxyphenoacetic acid (HPA), indole-3-acetamide (IAM), 1-naphthaleneacetic acid (NAA)	acetone extraction	centrifuge, filter and dilute
	Curcumin (PDA)	curcumin I, II, III	Ethanolic extraction	filter and dilute in EthOH:MeOH
	Pigments (PDA)	fucoxanthin, astaxanthin, zeaxanthin, lutein, violaxanthin, $\beta$ -carotene, chlorophyll A and B	dcm:methanol extraction	centrifuge, filter and dilute EthOH:IPA
	Sterols (PDA)	Ergosterol and cholesterol	hexane extraction (matrix dependent additions)	SPE Aminopropyl
	Xanthines (PDA)	caffeine, theobromine, theophylline	acidified water	filter and dilute in 0.1%FA/dH2O