

## ProcessLab Application Areas

### Automotive

Matrix	Parameter	Technique
Br <sub>2</sub> in water for rubber treatment	Br <sub>2</sub> content	Redox titration
Carbon black, additive for tire production	Carbon black	Redox titration
Phosphatizing baths	Free and total acid, accelerators, Zn, F	Acid base titration
Phosphatizing baths	pH, conductivity	Ion meters
Phosphatizing baths	Zn, Pb, Ni	Voltammetry (VA)
Transformer oil	Acid number	Non-aqueous acid base titration

### Biofuels

Matrix	Parameter	Technique
Biofuels	Cu	Voltammetry (VA)
Biofuels	pH value, chloride, sulfate, acid number, iodine number	Meters & titrations
Biofuels	Water content	Karl-Fischer Volumetry

### Chemical industry

Matrix	Parameter	Technique
Acetic acid	Iodide I <sup>-</sup>	Voltammetry (VA)
Bleaching agents	Cl <sub>2</sub> , ClO <sup>-</sup>	Redox titration
Brine, sole	Alkalinity, CO <sub>3</sub> <sup>2-</sup>	Acid base titration
Carbon black, additives for rubber, plastics	Carbon black	Redox titration
Detergents	Surfactants	ISE titration
End products	Quality control of various ingredients	Aqueous or non-aqueous titration
Inorganic salts	NO <sub>3</sub> <sup>-</sup>	ISE measurement
Inorganic salts	Water content	Karl-Fischer Volumetry
Organic salts, acids, bases	Water content	Karl-Fischer Volumetry
Process effluent	Cd, Co, Pb, Fe, Cu, Ni	Voltammetry (VA)
Process waters	Acidity	Acid base titration
Process waters	Alkalinity	Acid base titration
Process waters	p and m value	Acid base titration
Process waters	pH value, conductivity	Ion meters
Process waters	Total hardness	ISE titration
Raw materials	Sulfuric acid content	Acid base titration
Sodium hydrogen sulfide	S <sup>2-</sup> , H <sub>2</sub> S	Argentometric titration
Sodium hydroxide	Ni	Voltammetry (VA)
Sulfuric acid	Cr, Mo	Voltammetry (VA)
Surfactants	Water	Karl-Fischer Volumetry
Waste water	Automatic filtration	Liquid handling

### Detergents, Surfactants and Cosmetics

Matrix	Parameter	Technique
Disinfectants	Water content	Karl-Fischer Volumetry
Perfumes	Water content	Karl-Fischer Volumetry
Pharmaceutical drugs	Water content	Karl-Fischer Volumetry
Soaps, shampoos, washing solutions	Content of surfactants	ISE titration
Washing gels	Water content	Karl-Fischer Volumetry

## ProcessLab Application Areas

### Food and beverages

Matrix	Parameter	Technique
Beverages (water)	Conductivity, temperature, pH, alkalinity, hardness	Meters and titration
Edible fats and oils	Hydroxyl number	Non-aqueous acid base titration
Edible fats and oils	Iodine number	Non-aqueous acid base titration
Edible fats and oils	Peroxide number	Non-aqueous acid base titration
Edible fats and oils	Saponification number	Non-aqueous acid base titration
Ethanol	Fe, Zn, Pb, Cu, Cd	Voltammetry (VA)
Fruit and vegetable juices	Total acidity	Acid base titration
Fruit and vegetable juices	Vitamin C (ascorbic acid)	Acid base titration
Instant soups	Cl <sup>-</sup>	Argentometric titration
Mouth rinse solution	F <sup>-</sup>	ISE standard addition
Native olive oils	Acid number and free fatty acids (FFA)	Non-aqueous acid base titration
Native olive oils	Water content	Karl-Fischer Volumetry
Rinsing & disinfecting agents	Content of rinsing acid & peracetic acid (disinfectant)	Acid base titration
Wine	Free and total SO <sub>2</sub>	Biamperometric titration
Wine	pH and titratable acid	Acid base titration

### Metal industry

Matrix	Parameter	Technique
Process waters	CN <sup>-</sup>	Direct potentiometry
Zinc sulfate solution	Cd, Co, Pb, Ni, Ge, Sb	Voltammetry (VA)
Zinc sulfate solution	Fe	ISE titration

Matrix	Parameter	Technique
<b>Mining and Ores</b>		
Ores	Fe <sup>2+</sup> and Fe <sup>3+</sup>	Cerimetric titration
Iron and zinc ores	Cu	Voltammetry (VA)

### Paper and Pulp

Matrix	Parameter	Technique
Cooking liquor	Free and fixed sulfur dioxide	Redox titration
White and green liquors	Total, active and effective alkali, sulfate	Acid base titration
White, green and black liquors	H <sub>2</sub> S	Argentometric titration

### Petrochemical industry

Matrix	Parameter	Technique
Br <sub>2</sub> in gas	Br <sub>2</sub> content	Redox titration
Br <sub>2</sub> in water for surface refinement	Br <sub>2</sub> content	Redox titration
Carbon black, additives for rubber, plastics	Carbon black	Redox titration

### Pharmaceutical industry

Matrix	Parameter	Technique
Acidic and alkaline solids	Acidic and alkaline concentration	Titration
Drugs, raw material, final products	Water content	Karl-Fischer Volumetry
Eye drops	Thiomersal (Hg content)	Voltammetry (VA)
Final products	Final product quality control	Aqueous or non-aqueous titration
Raw materials	Active component	Acid base titration
Raw materials	Active components	Non-aqueous acid base titration
Raw materials	Content of acidic and basic ingredients	Acid base titration
Raw materials, tablets	Nicotinic acid amide	Non-aqueous acid base titration
Vitamin tablets	Vitamin C (ascorbic acid)	Acid base titration

### Plastics and Rubber

Matrix	Parameter	Technique
Br <sub>2</sub> in water for rubber treatment	Br <sub>2</sub> content	Redox titration
PET production	4-Carboxybenzaldehyde in terephthalic acid	Voltammetry (VA)

## ProcessLab Application Areas

### Plating and Galvanics

Matrix	Parameter	Technique
Acidic copper baths	Organic additives (suppressors, brighteners, levelers)	Cyclic voltammetric stripping (CVS)
Activator baths	Pd	Voltammetry (VA)
Alkaline zinc baths	Organic additives (suppressors, brighteners, levelers)	Cyclic voltammetric stripping (CVS)
Cyanidic gold baths	Co	Voltammetry (VA)
Electroless nickel baths	Ni, hypophosphite, alkalinity	Titration
Electroless nickel baths	Pb, Sb, Bi, Cd, iodate $\text{IO}_3^-$	Voltammetry (VA)
Etching and degreasing baths	Au, Pd, Al, acidity, alkalinity	ISE titration
Etching baths	F	ISE direct measurement
Etching baths	$\text{H}_2\text{O}_2$	Redox titration
Etching baths	Hydrofluoric and nitric acid mixtures	Acid base titration
Galvanic baths	Ni, Cu, Zn, Cr, Sn, Ag	ISE titration
Hydrofluoric acid	Water content	Karl-Fischer Volumetry
Nickel baths	Saccharin	Voltammetry (VA)
Nickel baths	Thiourea	Voltammetry (VA)
Pickling baths	$\text{Fe}^{2+}$ and $\text{Fe}^{3+}$ , free and total acid	Various titrations
Plating baths	$\text{NaOH}$ , $\text{CO}_3^{2-}$ , Zn, Cu, $\text{H}_2\text{SO}_4$	ISE titration
Plating baths	Zn, Cu and Ni, total acid and alkalinity	ISE and acid base titration
Rinsing and degreasing bath	pH, conductivity	Ion meters
Tin baths / tin-lead baths	Organic additives (suppressors, brighteners, levelers)	Cyclic voltammetric stripping (CVS)
Various baths	Metal traces e.g. Cd, Co, Pb, Fe, Cu, Ni	Voltammetry (VA)

### Power, Electricity and alternative Energies

Matrix	Parameter	Technique
Boiler feed water, cooling water	Conductivity, temperature, pH, alkalinity, hardness	Meters and titration
Boiler feed water, cooling water	Cu, Fe	Voltammetry (VA)
Flue gas desulfurization	$\text{SO}_4$ , Ca	ISE titration

### Semiconductor and Electronics

Matrix	Parameter	Technique
Etching bath	Acid mixtures	Acid base titration
Etching solution	Cu, $\text{H}_2\text{SO}_4$	ISE and acid base titration
Etching solution	Na-peroxodisulphate content	Redox titration
Metal baths	Ni, Fe	ISE titration
Treatment chemicals	KI, $\text{H}_3\text{BO}_3$	Redox and acid base titration

### Textiles

Matrix	Parameter	Technique
Tanning agents	$\text{H}_2\text{CrO}_4$ , $\text{Na}_2\text{CrO}_4$	Redox titration

### Water and Waste Water

Matrix	Parameter	Technique
Effluent	Cr	Cerimetric titration
Effluent	Fe, Cd, Pb, Cu, Ni, Co, Cr, Se, U	Voltammetry (VA)
Waste water	Automatic sample filtration	Liquid handling
Waste water	Extraction of organic components	Liquid handling
Water, drinking water, waste water	p and m value	Acid base titration
Water, drinking water, waste water	pH value, conductivity	Ion meters
Water, drinking water, waste water	Total hardness	ISE titration
Water, waste water	Acidity	Acid base titration
Water, waste water	Alkalinity	Acid base titration