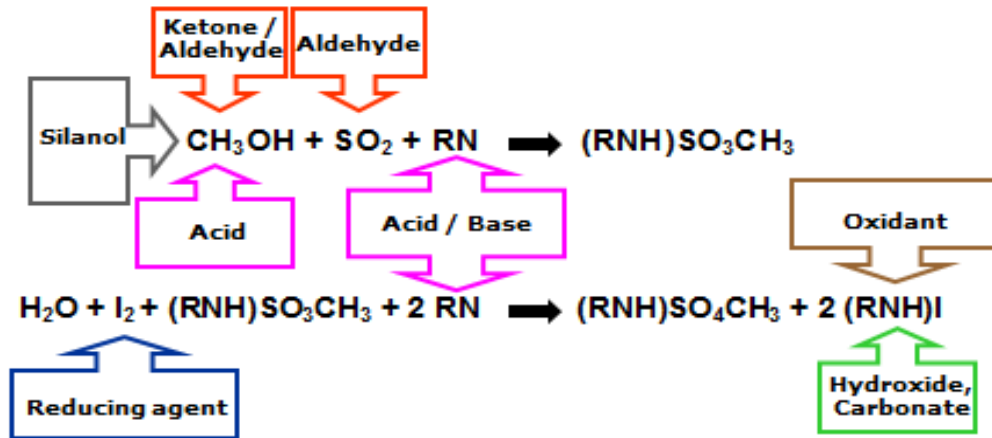


KARL FISCHER QUICK REFERENCE

KF Reaction

- I. $\text{CH}_3\text{OH} + \text{SO}_2 + \text{RN} \rightarrow [\text{RNH}]\text{SO}_3\text{CH}_3$
- II. $\text{H}_2\text{O} + \text{I}_2 + [\text{RNH}]\text{SO}_3\text{CH}_3 + 2\text{RN} \rightarrow [\text{RNH}]\text{SO}_4\text{CH}_3 + 2[\text{RNH}]\text{I}$

Side Reaction Locations



KF Side Reaction Solutions

Side Reaction	Volumetric Solution	Coulometric Solution
Aldehydes/Ketones	Methanol-free reagents	
Acid	Buffer w/ imidazole and/or use methanol free reagents – or – Use Buffer Acid (contains MeOH)	Buffer w/ imidazole and/or use methanol free reagents
Base	Buffer w/salicylic or benzoic acid	Buffer w/benzoic acid
Silanol	Methanol-free reagents	
Oxidizing Agents	Lower temperature (peroxide) – or – Pretreat w/ excess SO_2 (chlorine, bromine)	
Reducing Agents	Phenols – add salicylic acid until pH<5 Salts – oven method Ascorbic acid/Hydrazines	
Oxides, Hydroxides, Carbonates	Oven	

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KF Reagents

Common Volumetric Reagents	
Composite 5	Most common titrant
Composite 2	Preferred titrant for lower water content
Methanol Dry	Most common sample solvent
Methanol Rapid	Solvent for accelerated titrations
CompoSolver E	Methanol free solvent medium
Solver(Crude) Oil	Working medium for oils
LipoSolver CM	Working medium for oils; contains chloroform
Composite 5K	Titrant for aldehyde and ketone samples
Working Medium K	Working medium for aldehyde and ketone samples
Medium K	Working medium for aldehyde and ketone samples; improved, less toxic replacement for Working Medium K

Common Coulometric Reagents	
Coulomat AG	General purpose; with and without diaphragm
Coulomat AG-H	Anolyte for use on long-chain hydrocarbon samples
Coulomat E	Ethanol based; with and without diaphragm
Coulomat AG-Oven	For Karl Fischer Oven methods
Coulomat A	General purpose anolyte solution containing chloroform; with diaphragm
Coulomat CG	General purpose catholyte solution; with diaphragm
Coulomat AK	Anolyte solution for aldehyde and ketone samples
Coulomat CG-K	Catholyte solution for aldehyde and ketone samples
Coulomat Oil	Anolyte solution for oil samples

Acidic Samples – Buffer and/or use methanol-free reagents	
Volumetric	Coulometric
<ul style="list-style-type: none"> Hydranal Buffer Acid – contains methanol! Imidazole – 5-7g per 30mL of solvent 	<ul style="list-style-type: none"> Imidazole – 20g per 30mL of solvent

Basic Samples – Buffer	
Volumetric	Coulometric
<ul style="list-style-type: none"> Hydranal Buffer Base – salicylic acid based buffer Hydranal Benzoic Acid – contains <0.2% water Use 5-7g per 30mL solvent 	<ul style="list-style-type: none"> Hydranal Benzoic Acid – 20g per 100mL solvent No salicylic acid (oxidizes at cathode) No acetic acid (water is produced)