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Women in Engineering Program

*Cockrell School of Engineering*



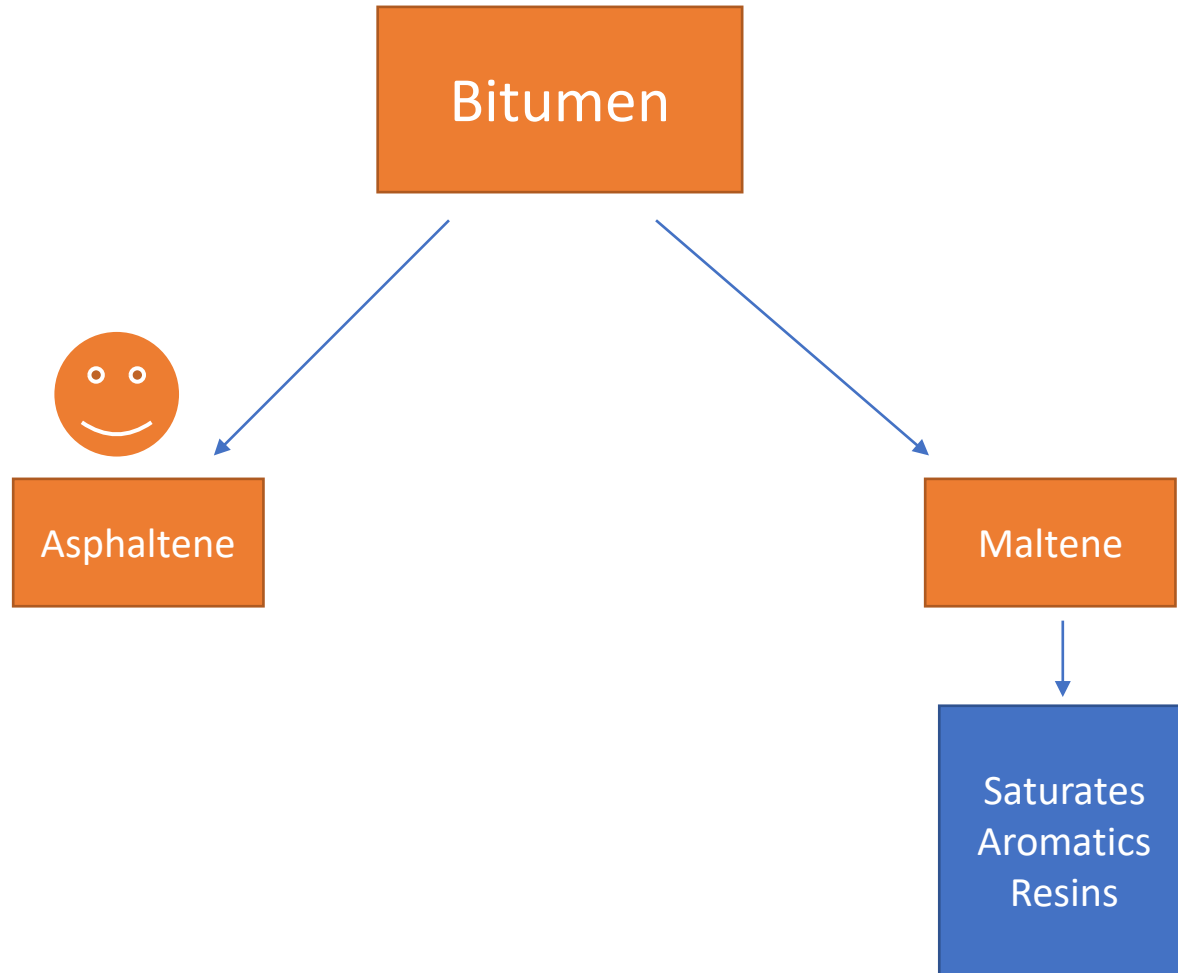
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Project: Estimating Polarity-Based Distribution of Bitumen by Simplified Chromatographic Techniques

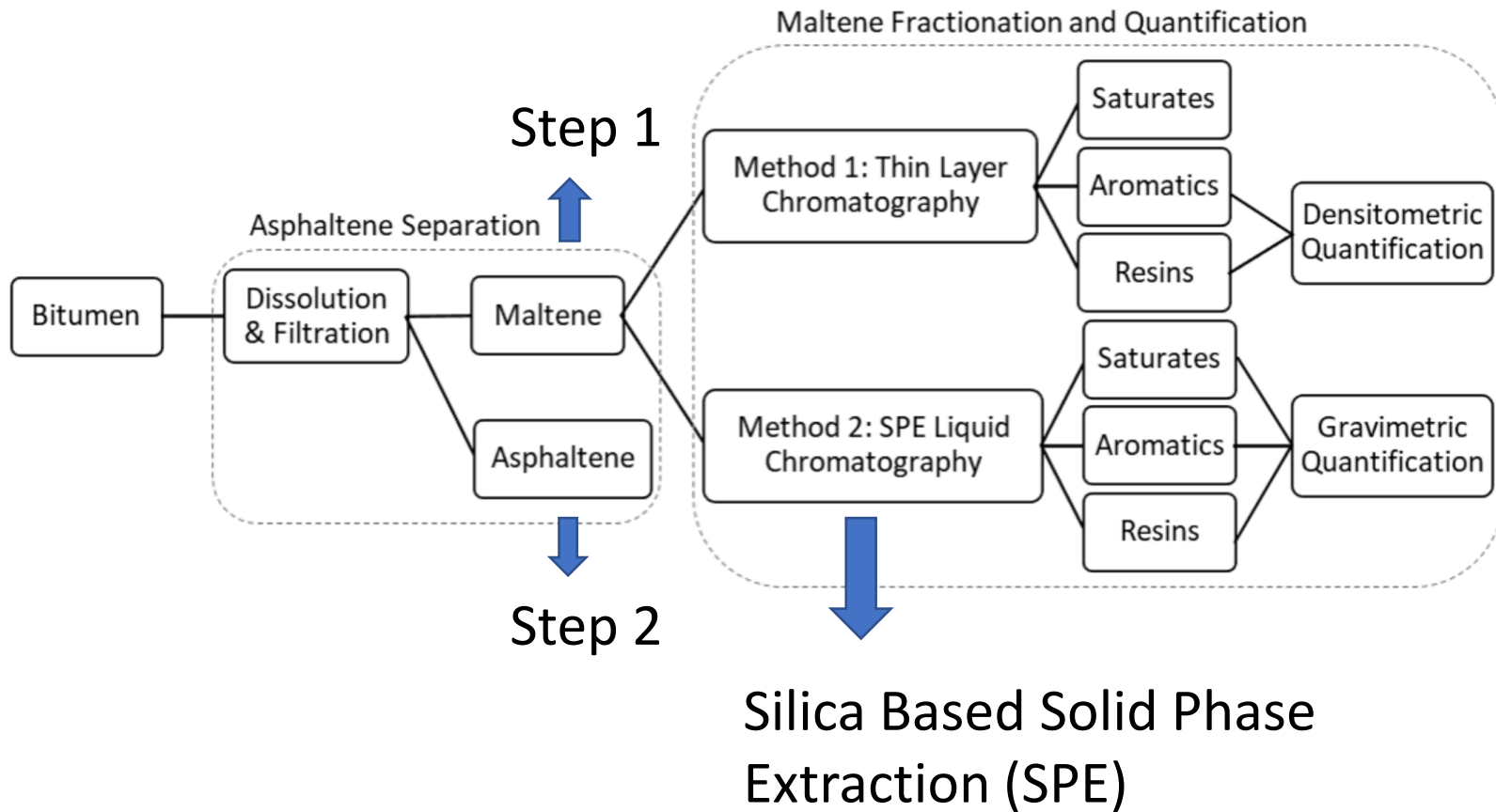
## Bitumen



Black thick viscous liquid that is obtained from petroleum distillation or naturally from subsurface



# Outline/Goal:



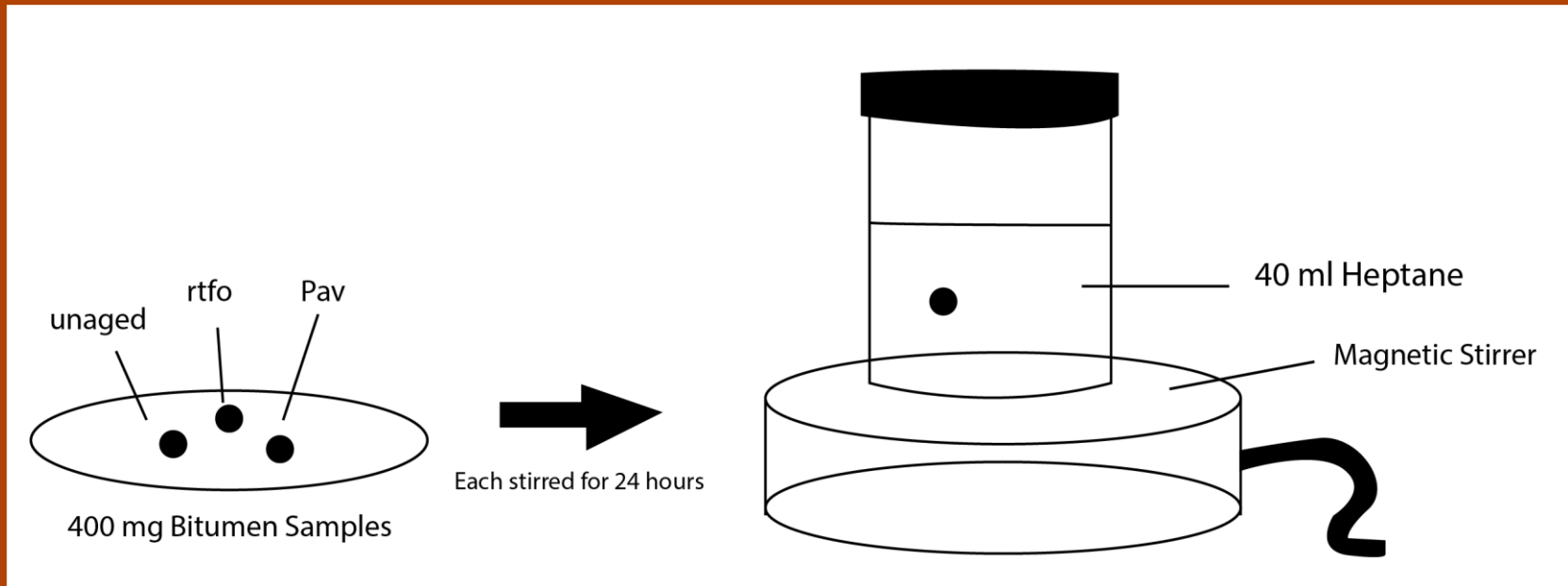
# The Job

- Reduce time and operation costs of Bitumen separation process
- Increase repeatability of testing with reducing bias
- Compare results with historical and existing methods to verify
- Observe the effect of bitumen aging and blending



# STEP 1: Asphaltene Filtration

- 400 mg of 3 different category Bitumen samples are diluted with 40ml of heptane and stirred for 24 hours



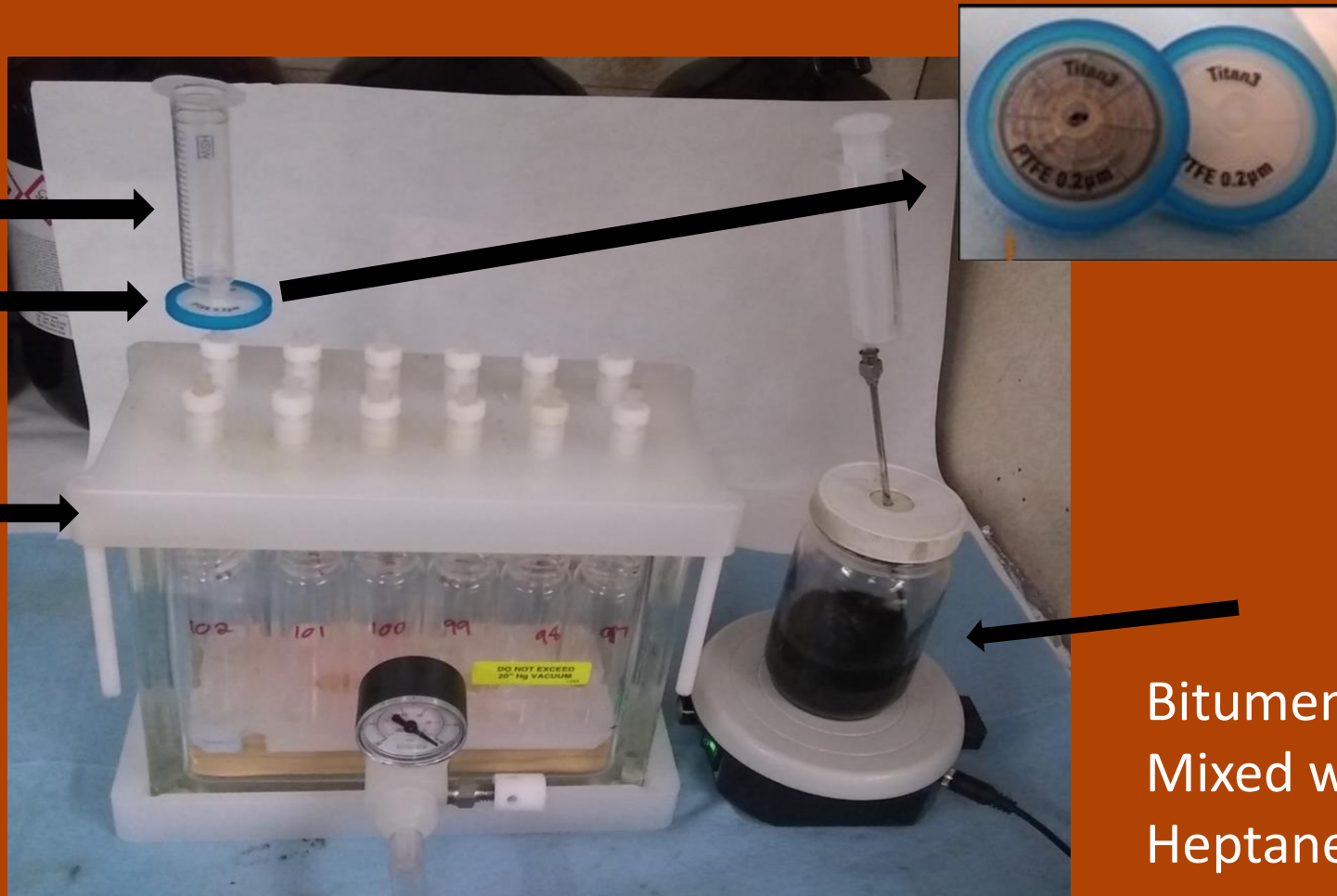
- The syringes are mounted on the 12 port vacuum manifold and above the filters
- The solution is poured down into the syringe which goes through the filters
- The 0.2-0.22  $\mu\text{m}$  filters collect Asphaltene and Maltene is extracted into the vials
- The process of filtration is increased by applying a vacuum

syringe

Filter

Vacuum  
Manifold

Bitumen  
Mixed with  
Heptane



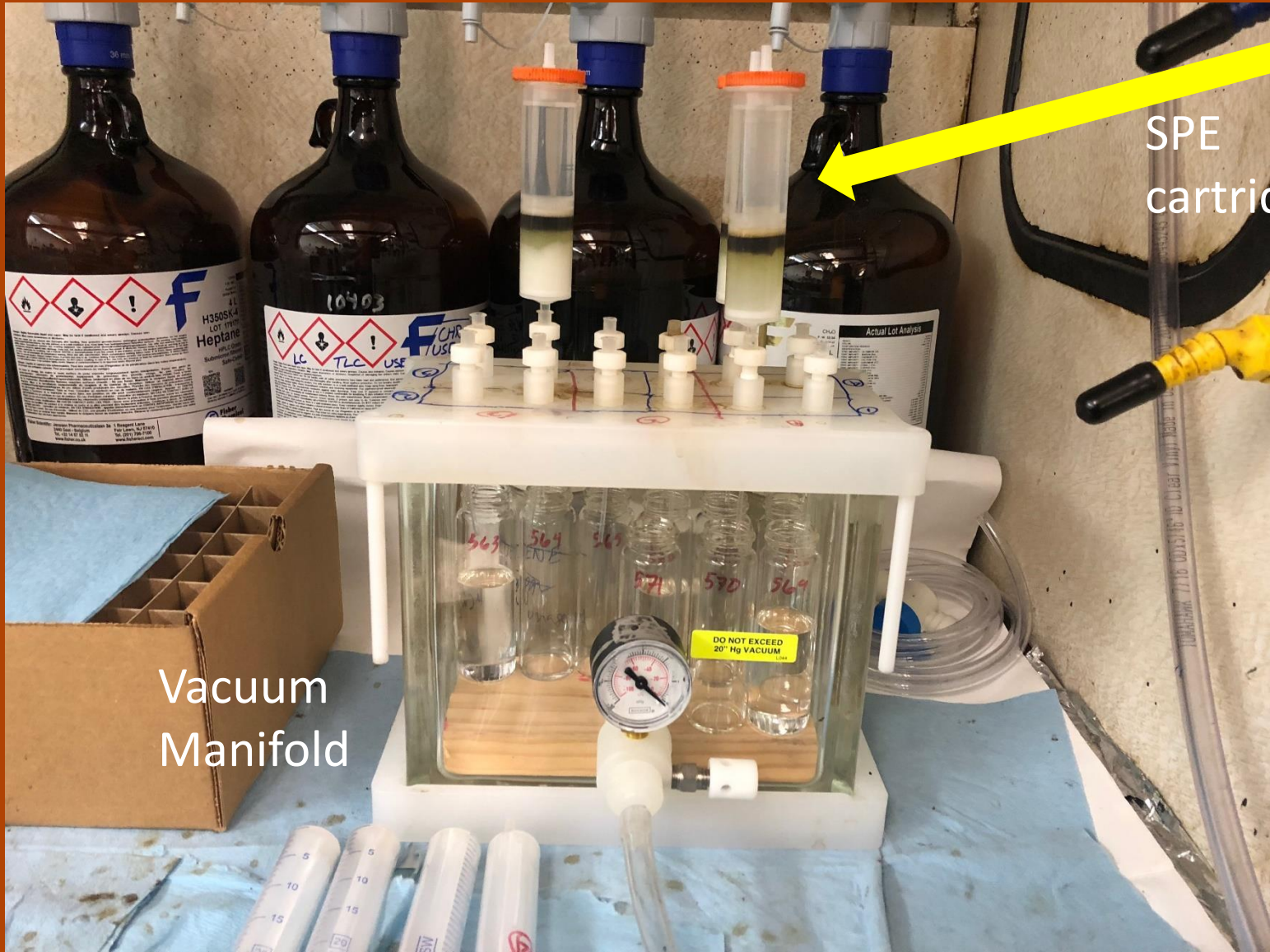


- Maltene is dried in the oven and weighted to measure Asphaltene content
- The extracted Maltene is used in fractionation process to separate into SARA



# STEP 2: Maltene Fractionation

- Maltene extracted from asphaltene filtration is poured into the mounted Silica based Solid Phase Extraction (SPE) cartridges on vacuum manifold
- 50 mg of Maltene is separated in Saturates, Aromatics and Resins
- Prewash and three elution steps are used to separate Maltene into SARA



SPE  
cartridges

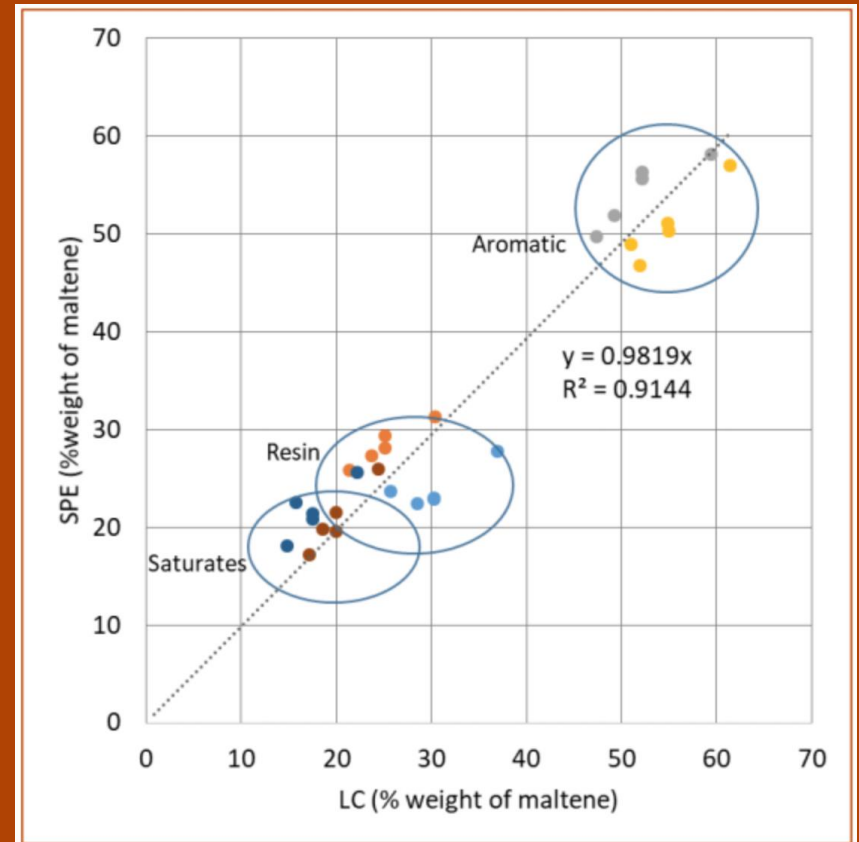
Vacuum  
Manifold

# Data Obtained

Batch no	Bitumen Samples	Bottle no.	Sample no	Weight
10281	unaged	1	1	400.22
10281	unaged	2	2	410.32
10281	rtfo	3	1	408.71
10281	rtfo	4	2	413.32
10281	pav	5	1	420.52
10281	pav	6	2	411.74

Binder	Effect of ageing	Maltene (mg)	SAR	SAR of binder
10281	unaged	75.02	Saturate	17.77
			Aromatics	20.40
			Resins	36.86
10281	unaged	74.24	Saturate	12.38
			Aromatics	42.08
			Resins	19.78
10281	rtfo	76.74	Saturate	22.03
			Aromatics	37.80
			Resins	16.91
10281	rtfo	76.33	Saturate	27.17
			Aromatics	28.68
			Resins	20.48
10281	pav	70.72	Saturate	17.59
			Aromatics	33.12
			Resins	20.01
10281	pav	65.19	Saturate	18.77
			Aromatics	30.52
			Resins	15.90



# Discussion

- The results obtained are close to values from existing standards
- The process is repeatable and shows clear effect of ageing
- This proves that the SPE chromatography method is cost efficient

# Future Work

No thank you

# Questions ?



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