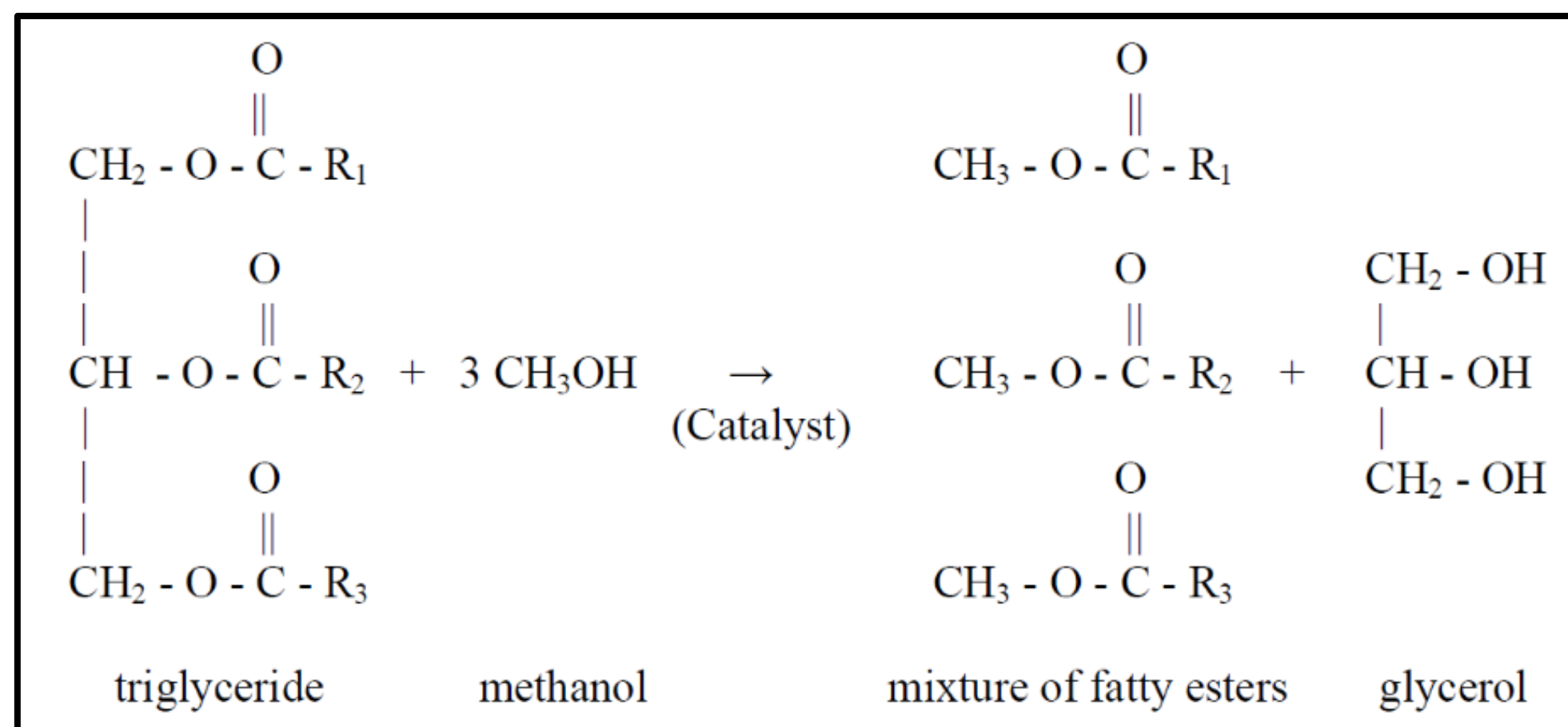


OBJECTIVE

Design a portable biodiesel production system utilizing a liquid-phase plasma discharge reactor.

BACKGROUND

Implementing biodiesel in place of petroleum diesel can significantly mitigate greenhouse gas emissions and fossil fuel dependency. Current production methods are costly and inefficient.

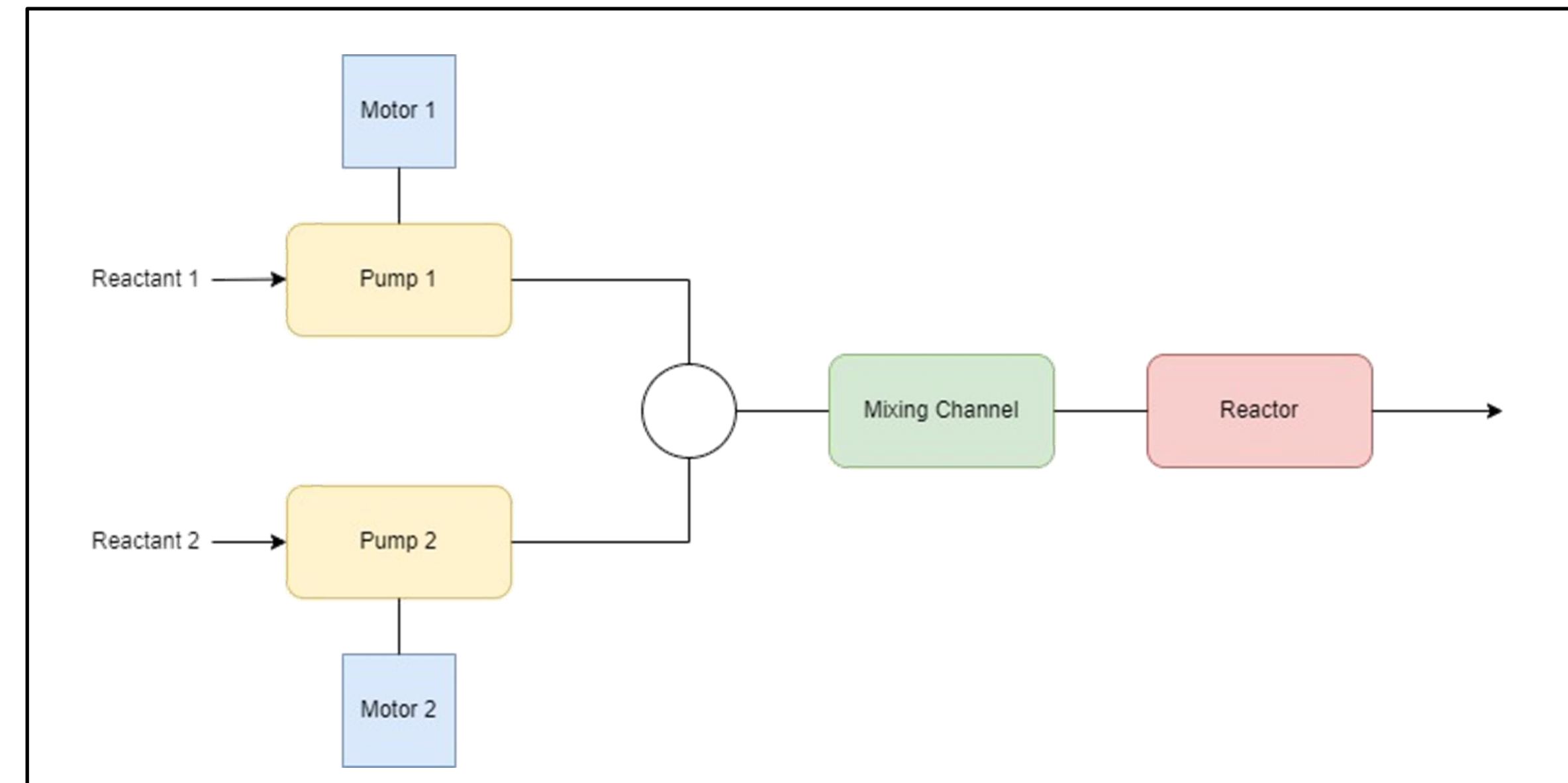


Transesterification Process

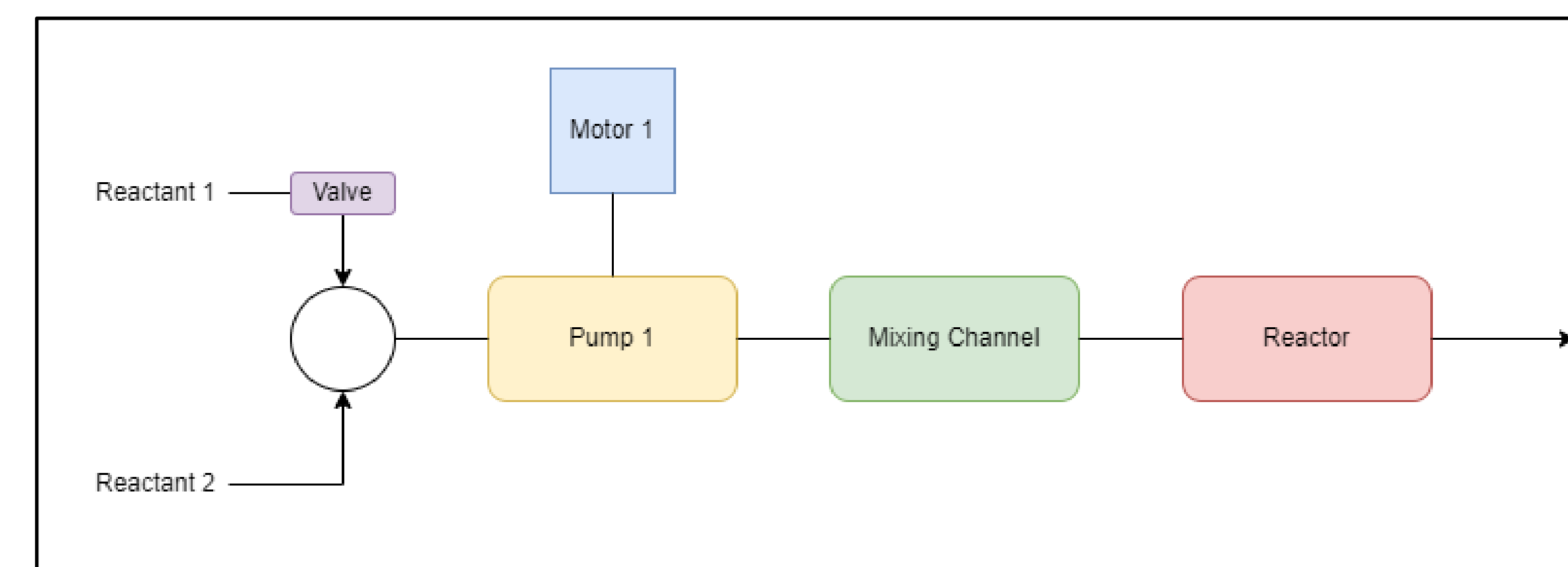
REQUIREMENTS

- Portable System
- Single Operator
- Optimal Power Delivery
- Continuous On-Board Mixing
- Successful Reaction

CONCEPT DEVELOPMENT



Initial Design



Final Design



Fuel Successfully Produced by System

DESIGN VALIDATION

Current System Testing (2022-02-23)			
Trial	Oil	Methanol	Flow rate (mL/s)
Trial 1	70	30	3.1
Trial 2	75	28	3.3
Trial 3	63	39	3.0
Trial 4	72	29	2.9
Trial 5	68	29	3.2
Trial 6	71	28	4.1
Trial 7	68	27	3.3
Trial 8	80	22	3.2
Trial 9	67	33	3.3
Trial 10	73	32	3.3
Average	70.7	29.7	3.3

Recorded Ratios of Oil to Alcohol Demonstrate System Consistency

ACCOMPLISHMENTS

- Continuous Fuel Production
- Portable System
- Variable Mixing Ratios

FUTURE CONSIDERATIONS

- Electronic Mixing Control
- Sensor Implementation
- Updated User Interface

ACKNOWLEDGEMENTS

Client: Dr. Sarah Wu

Lead Instructor: Dr. Russel Qualls

Mentor: Philip Hagen



Upper Tier of System



Lower Tier of System