

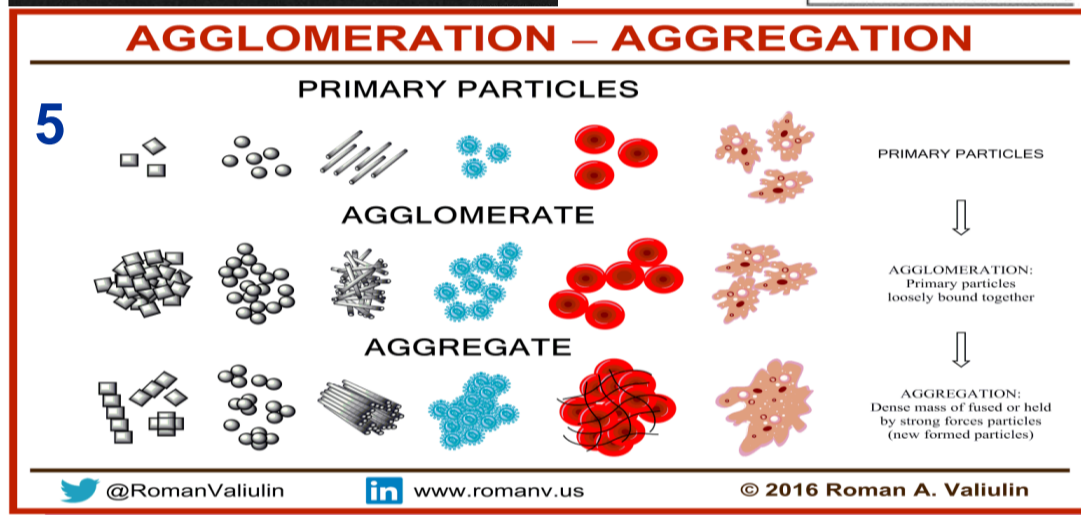
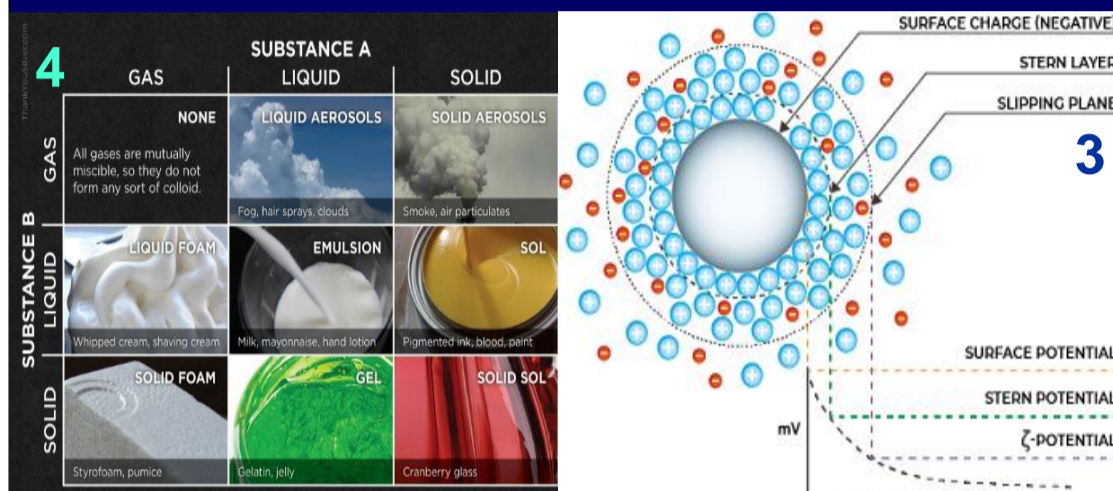
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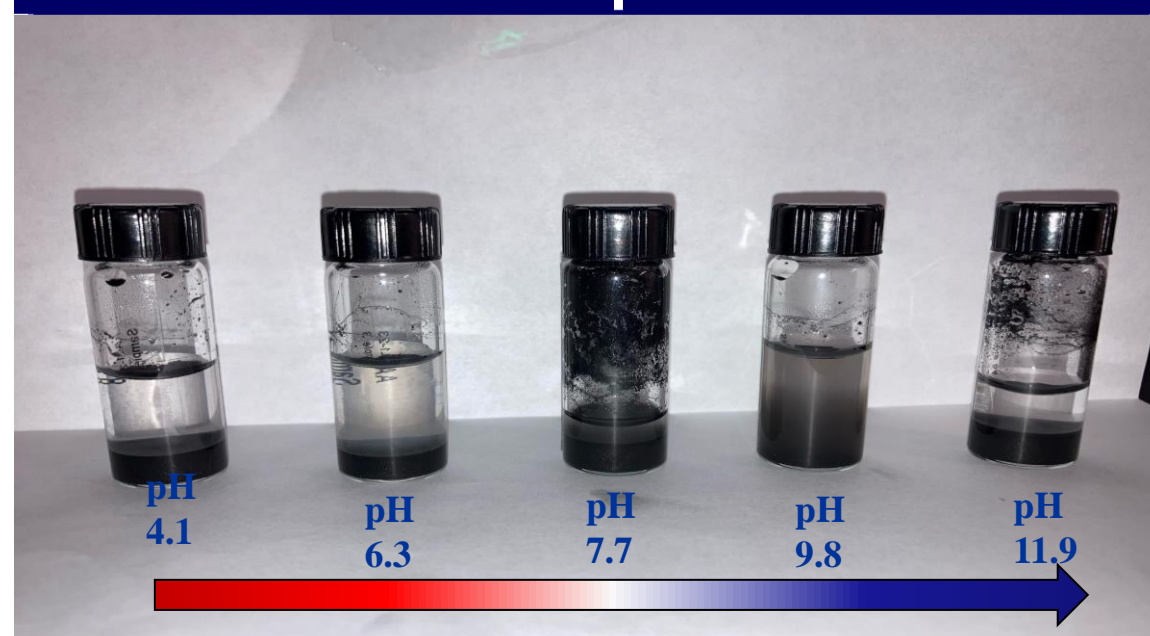
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Background



- A colloid consists of a dispersed phase inside of a medium. The typical size range is 1nm to 1000nm¹.
- Zeta potential is the electric potential at the shear plane of a colloidal particle¹.
- Aggregation is the formation of larger particles from the particles of a colloid².

Sample



Results & Discussion

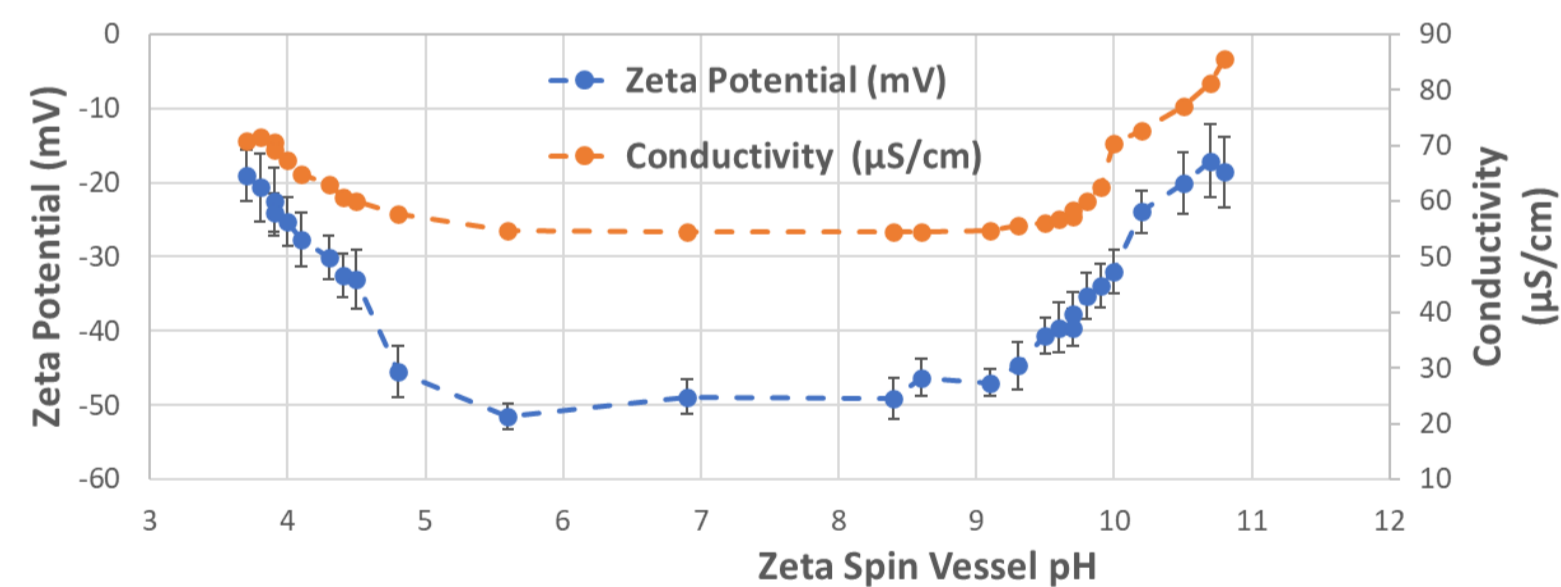
Number Average Hydrodynamic Diameter Percentiles of Coal at Various pH Ranges

Percentile	pH 3.1	pH 5.3	pH 6.3	pH 7.7	pH 9.8	pH 11.9
d10 (μm)	0.441 ± 0.001	0.442 ± 0	0.408 ± 0.004	0.437 ± 0.026	0.400 ± 0.0021	0.407 ± 0.032
d50 (μm)	0.553 ± 0.007	0.546 ± 0.001	0.496 ± 0.001	0.521 ± 0.032	0.509 ± 0.003	0.464 ± 0.036
d90 (μm)	1.094 ± 0.059	0.897 ± 0.898	0.712 ± 0.083	0.732 ± 0.089	0.845 ± 0.013	1.121 ± 0.931
Mean (μm)	0.727 ± 0.016	0.663 ± 0.004	0.608 ± 0.054	0.618 ± 0.039	0.611 ± 0.004	0.675 ± 0.152

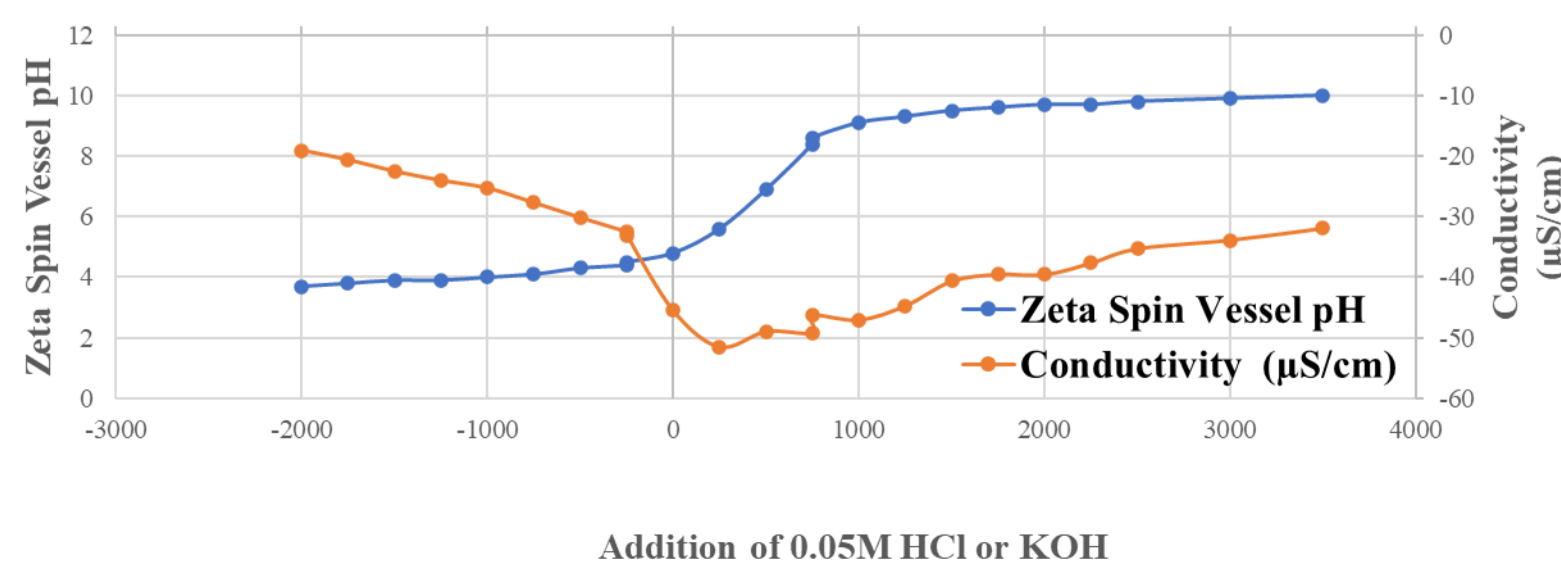
Volume Average Hydrodynamic Diameter Percentiles of Coal at Various pH Ranges

Percentile	pH 3.1	pH 5.3	pH 6.3	pH 7.7	pH 9.8	pH 11.9
d10 (μm)	1.856 ± 0.048	0.748 ± 0.039	0.640 ± 0.130	0.574 ± 0.030	0.596 ± 0.002	2.279 ± 1.483
d50 (μm)	8.06 ± 0.48	3.6 ± 0.531	2.785 ± 0.268	2.508 ± 0.04	2.383 ± 0.009	9.673 ± 5.238
d90 (μm)	31.756 ± 0.639	70.206 ± 50.61	7.35 ± 0.641	6.74 ± 0.512	6.76 ± 0.085	27.753 ± 16.30
Mean (μm)	12.986 ± 0.200	19.153 ± 9.028	3.593 ± 0.545	3.2 ± 0.164	3.273 ± 0.045	12.973 ± 7.495

Zeta Potential and Conductivity of Anthracite Coal as a function of Solution pH



Solution pH and Conductivity as a Function of Addition of 0.05M HCl or KOH



Conclusion

- Zeta potential was largest at pH 5.6
- Aggregation and agglomeration occurs at high and low pH
- Acidic pH had the largest particles
- pH 7.7 had the smallest aggregates
- The most stable colloid is one with a pH that is not too acidic or basic

Acknowledgements

Dr. James Adair, Brett Rosoff-Verbit, and the MCREU program

References

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