Laboratory Applications

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What are contaminants normally found in hydrogen from fueling nozzle?

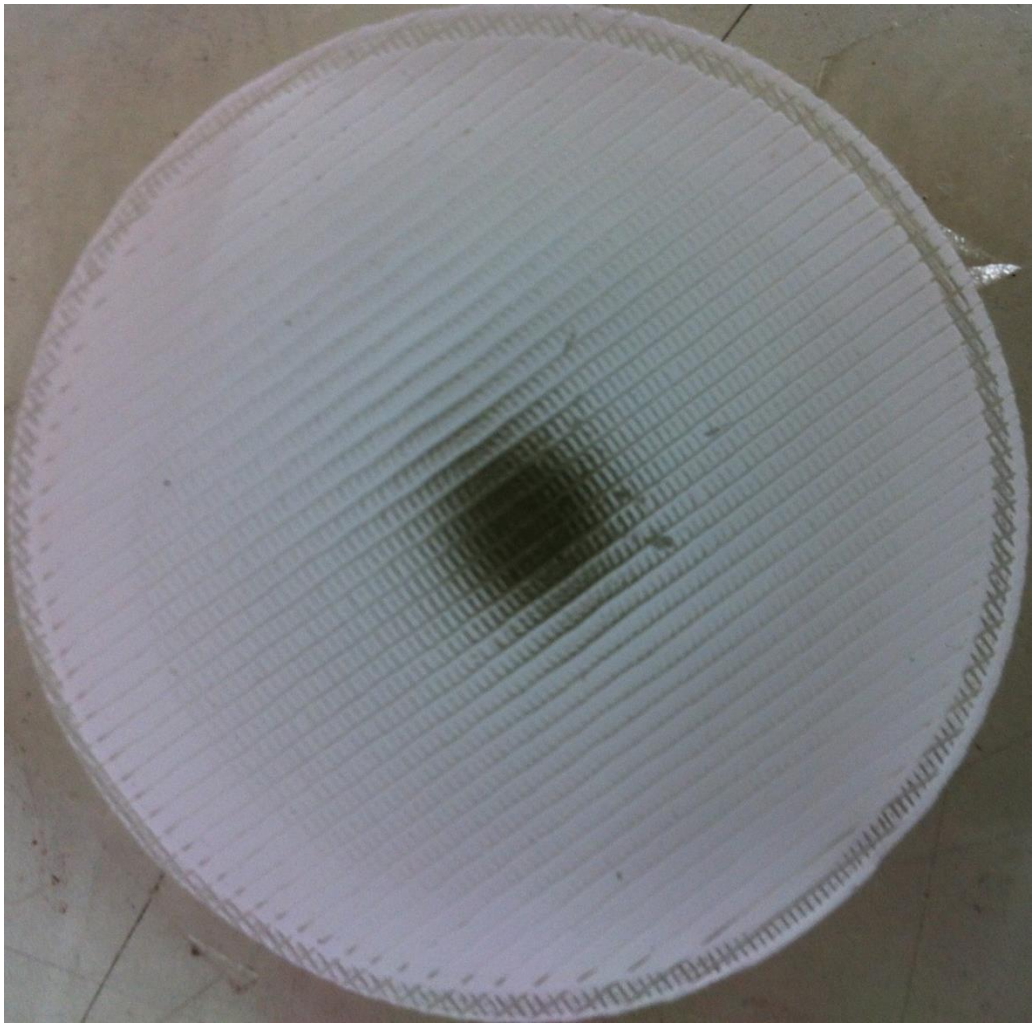
Particulates are most common found in Hydrogen - 96% hydrogen fuel contains particulates in 108 Particulate Samplings.

Typical Particulate filter –
0.035mg/kg

H_2 Station X Particulate Sample

Particulate Concentration at 700 Bar: 2.0 mg/kg

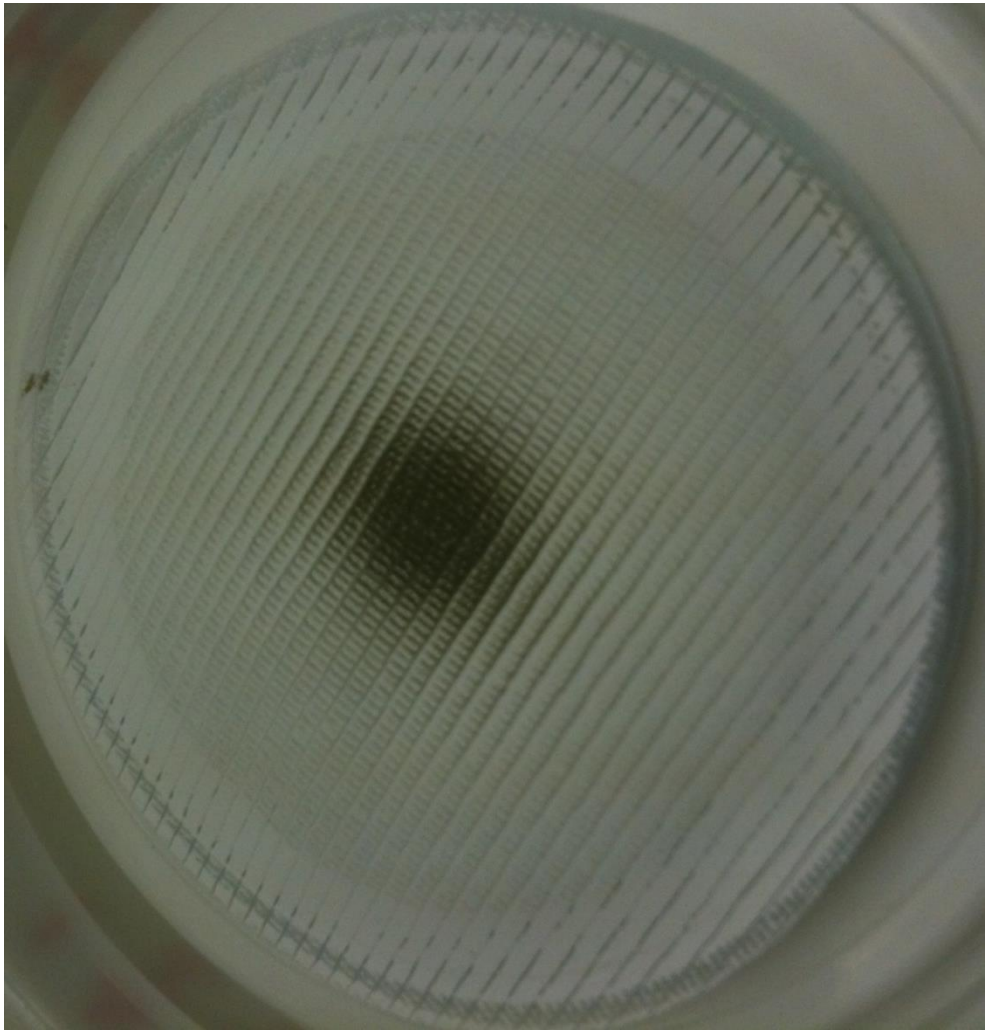
Particulate filter after sampling, in which 4.001mg particulates are found in 2 kilogram hydrogen



H_2 Station Y Particulate Sample

Particulate Concentration at 700 Bar: 2.02 mg/kg

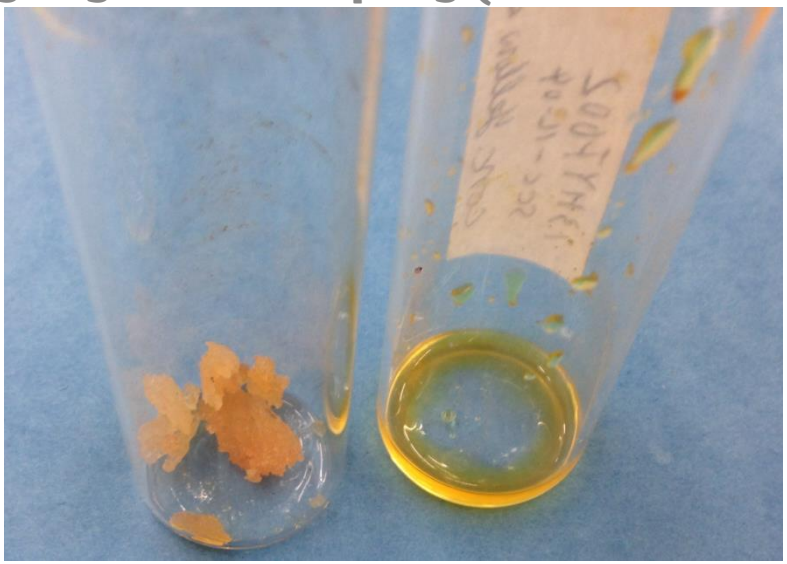
Particulate filter after sampling, in which 4.031mg particulates are found in 2 kilogram hydrogen

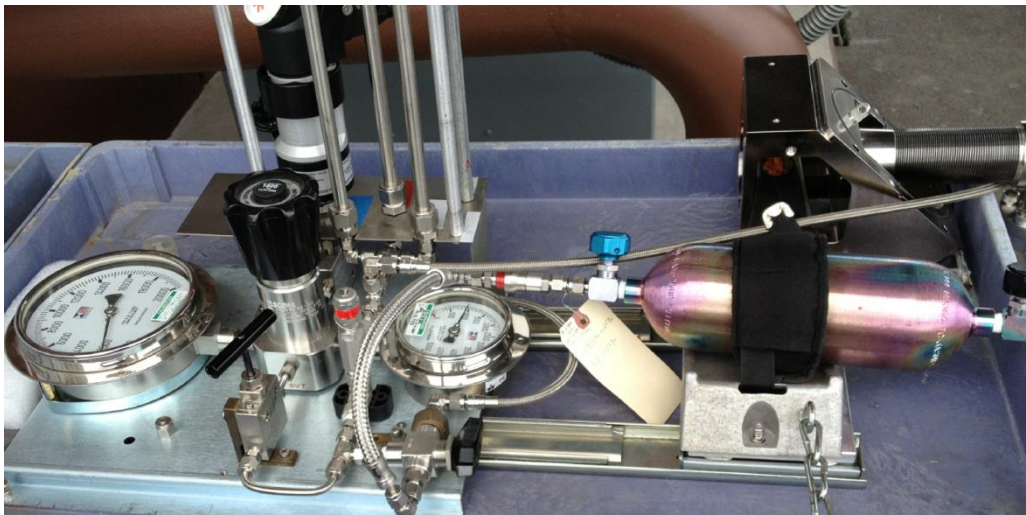


H_2 Station Z

Particulate Concentration at 700 Bar: > 1.27 g/kg

It was found that the sample container severely restricted hydrogen flow at 1000 psi during hydrogen gaseous sampling (ASTM D7606-11)





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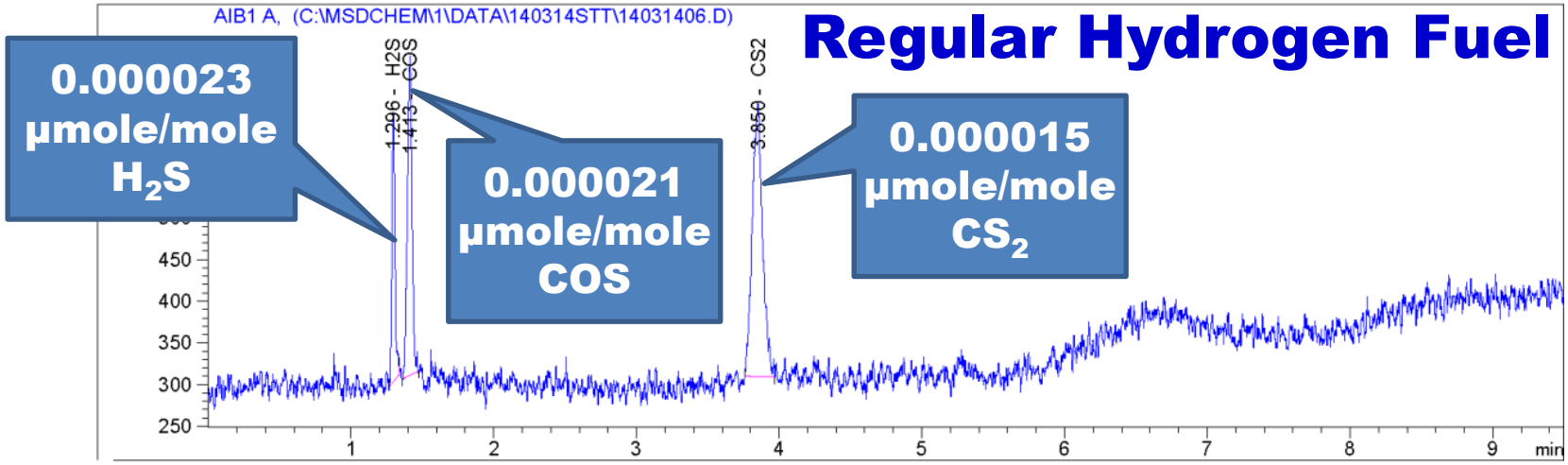
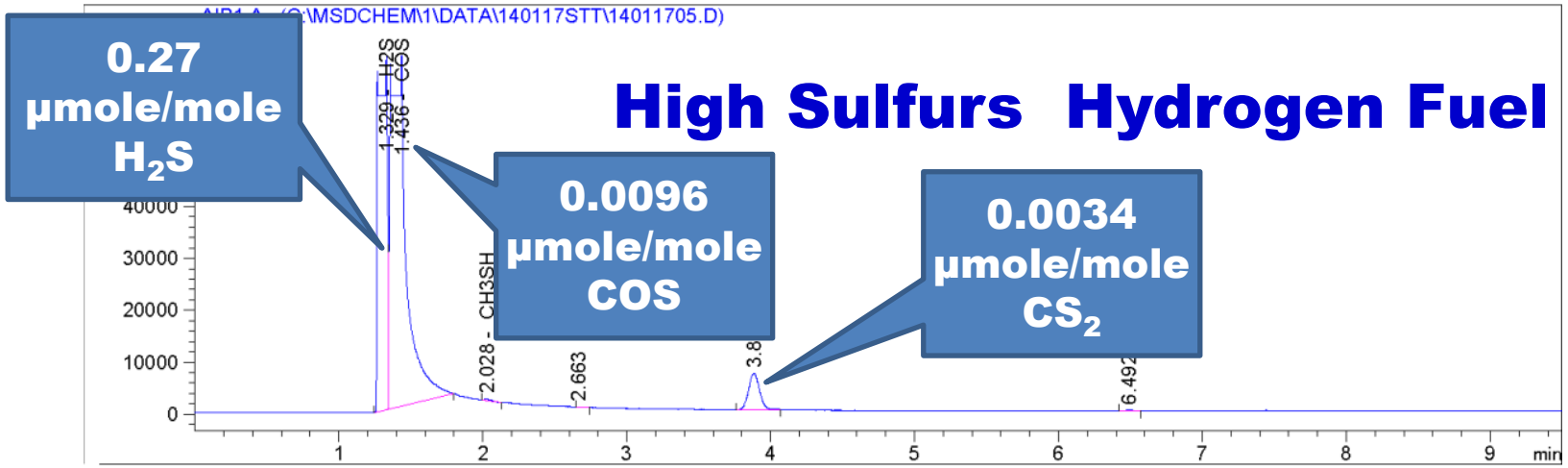
Sulfurs – Most of the hydrogen samples contain trace amount of sulfurs; however, high level sulfurs is occasionally found, especially while new stainless steel tubing installed.





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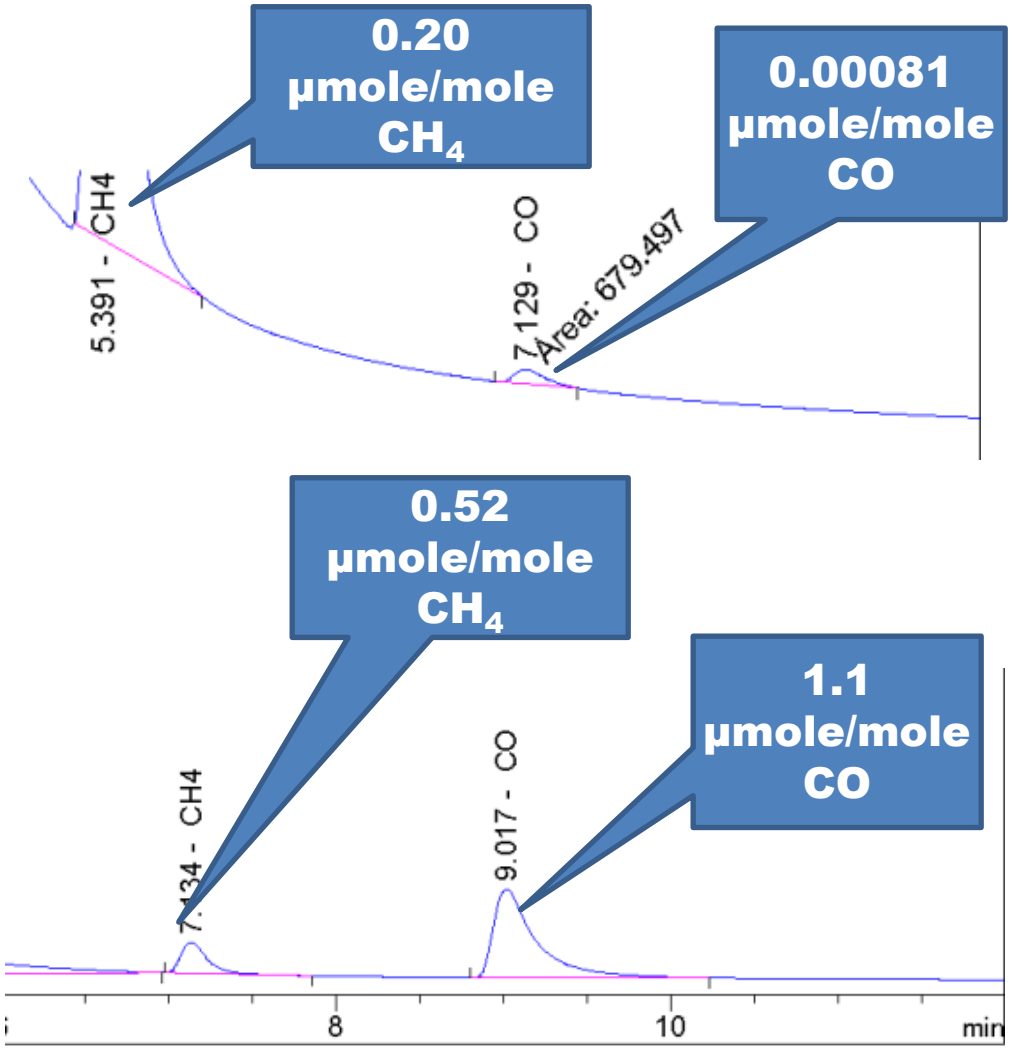
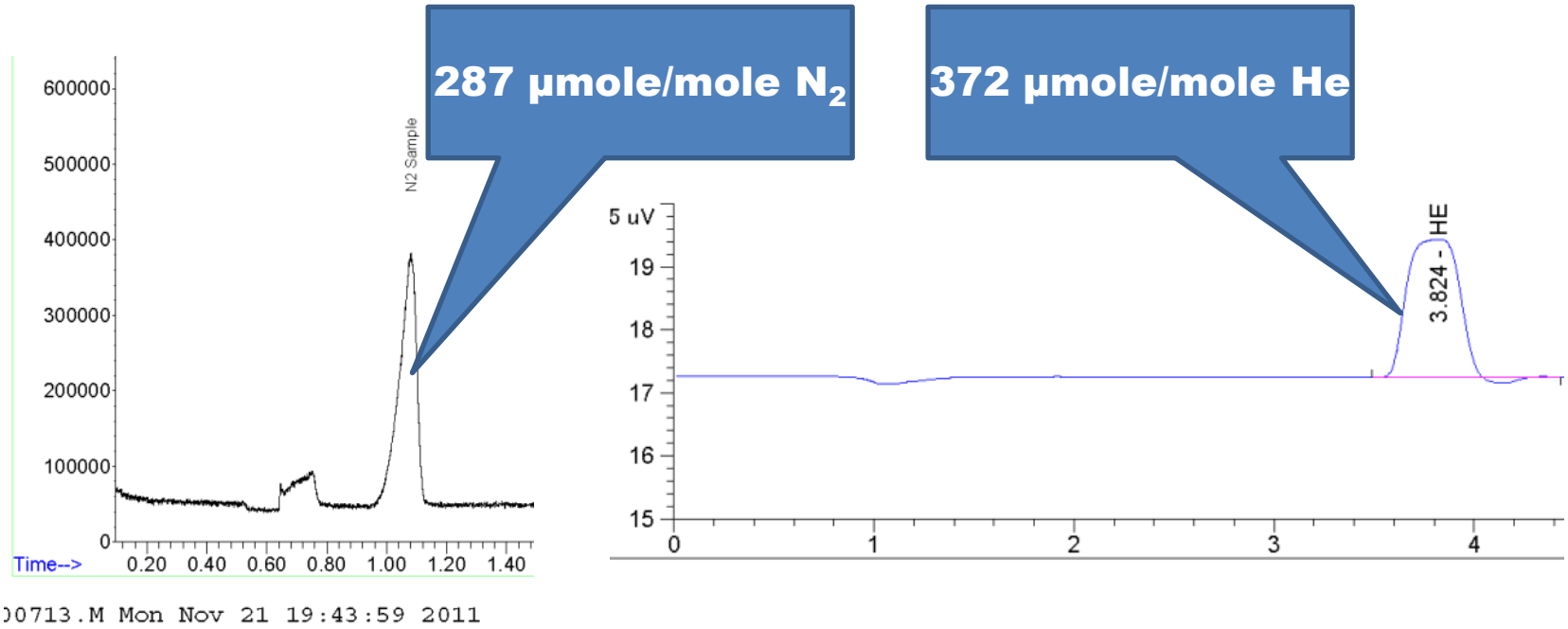
CO – All the hydrogen samples contain trace amount of CO and CH_4; however, high level CO is occasionally found.



N_2 - normally found in new hydrogen fueling stations

He - normally found in hydrogen from SMR



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CO_2, O_2, H_2O, Ar, hydrocarbon (ethanol, isopropanol, etc.), and organic halide (high MW freon, etc.) are frequently found in hydrogen fuel.

Conclusion: All the contaminants mentioned in hydrogen fuel should be monitored frequently.