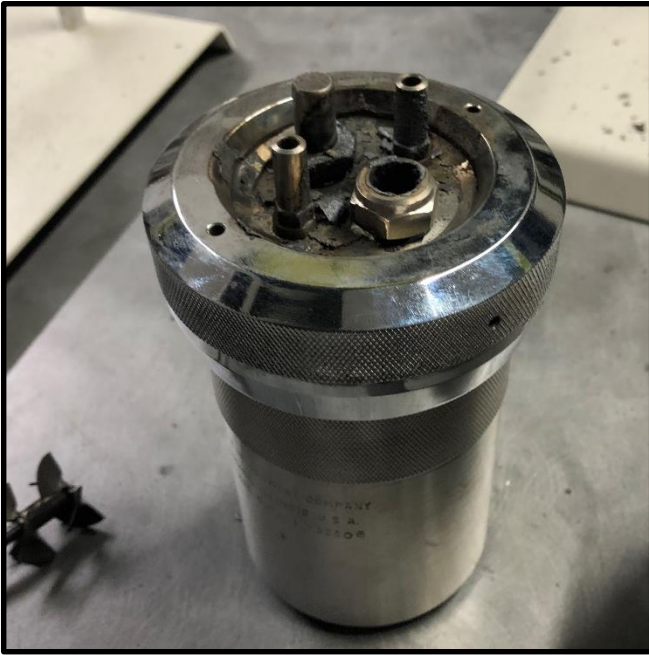


Safety Alert

Oxygen Combustion Vessel Failure

January 2020



Description

The incident happened during a training session for demonstrators in an undergraduate teaching laboratory. The experiment involved combustion of a sample of diesel in a Parr Oxygen Combustion Vessel (bomb calorimeter) in an oxygen atmosphere (20bar pressure). When the sample was ignited using an electronic igniter a large jet of flame was observed from the manual pressure relief valve which melted through the stainless steel valve causing significant damage to the bomb, blowing the lid of the surrounding water jacket off and causing some damage to the ceiling. Fortunately no-one was hurt but the potential for injury was high as the demonstrators were observing the process closely and were not wearing any protective clothing or safety glasses. Although it was initially thought that there had been an explosion, in fact a small leak of oxygen had occurred, allowing the fuel-oxygen mixture to ignite acting like a cutting torch which melted through the steel valve causing severe damage to the equipment.

Actions Taken

- The equipment was immediately removed from service pending investigation and it was found that the equipment was being operated in accordance with the manufacturer's instructions. However, it had not been maintained as directed by the supplier and the possibility of this type of accident clearly identified in the instruction manual. No risk assessment for the process was available which was also a concern.

Learning Points

- Laboratory equipment should always be operated and maintained in accordance with the with the instructions and guidance provided by the supplier to avoid foreseeable failures such as this one.
- Laboratory equipment (including equipment used for teaching) should not be used unless a suitable and sufficient risk assessment has been completed with the significant findings recorded and appropriate safety measures put in place.