Supplemental Information— Durability Assessment of Culture Flasks

Five 250ml flasks were filled with just over 10 ml water that was dyed red for visualization. The flasks were then dropped twenty times onto a linoleum floor with a single layer of paper to highlight spatter patterns. Drop methods are described below.

Trial 1

Each flask was dropped from a more or less normal carrying position.

1. Flask cracked at lid, no liquid was released
2. No breakage/leakage
3. No breakage/leakage
4. No breakage/leakage
5. Broken at bottom corner, fluid spatter onto paper substrate, probable aerosolization.

Trial 2

Repeated trial 1 technique, exaggerated.

1. No breakage/leakage
2. No breakage/leakage
3. No breakage/leakage
4. No breakage/leakage

Trial 3

Repeated trial 1 technique.

1. No breakage/leakage
2. No breakage/leakage
3. No breakage/leakage
4. No breakage/leakage

Trial 4

All four remaining flasks were stacked and dropped as a group.

1. No breakage/leakage
2. When held from the bottom with the top two flasks hitting the ground, plastic pieces were found and fluid was noted leaking from the cap. Flask was cracked and only a drop was noted to escape the container.

Trial 5

Return to single flask technique from trial 1.

1. No breakage/leakage
2. No breakage/leakage
3. No breakage/leakage

Conclusion

If cap was sealed, only two of 23 drops led to a rupture of the container. Only one involved an energetic release of some the fluid inside (roughly 20%) and one involved a small leak (of less than 10% of the fluid). Therefore a catastrophic release is predicted about 4% of the time, and a small leak about 4% of the time a flask is dropped.

Trial 6

Caps were loosened on all remaining flasks and they were dropped individually.

1. No breakage/leakage
2. Cap fell off, minor leakage noted.
3. No breakage/leakage
4. Minor leakage from around cap
5. Splash noted from cap area at impact
6. Few drops noted from cap area
7. Leakage from cap

Conclusion

If cap is loose and flask is dropped, 4/7 (57%) involved less than 10% of the fluid leaving the flask near the site of the drop, in 1 drop (14%) about 20% of the fluid left the flask with enough energy to produce an aerosol. In only 29% of the drops did all of the fluid stay within the flask.