# What Causes Splashing on a Dry Surface?

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When a drop of fluid lands with high velocity on a smooth dry surface, one might normally expect the drop to splash and break up into many smaller droplets. However, we have observed a striking phenomenon that the splash can be completely suppressed by moderately decreasing the pressure of the surrounding gas. For a given impact velocity there is a threshold pressure where the splash first occurs. Our measurements, showing that this threshold pressure depends on the molecular weight of the gas and the viscosity of the liquid, support a model in which the gas compressibility is responsible for creating the splash[1]. We have also measured the size distribution of the droplets emitted from the splash. At high gas pressure a broad distribution of droplet sizes is found which becomes more peaked at a characteristic size as the gas pressure is lowered towards the splash/no-splash transition. When the substrate is rough we found that both the surface roughness as well as the pressure of the surrounding gas contribute but in different ways to splashing: A "coronal" splash caused by the presence of air has the same characteristics as the splash observed on smooth substrates; an additional "prompt" splash at the expanding contact line is caused by surface roughness. For a rough surface, the distribution of droplets emanating from a splash is correlated with the surface roughness.

**References**

[1] Lei Xu, Wendy Zhang and Sidney Nagel, *Phys. Rev. Lett*, **94**, 184505(2005).

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