# Thin Layer Chromatography

CHEM 12A Section 311 Laboratory
September 2nd, 2020

**Step 1**

We begin with a blank TLC plate.

Predominantly, these are Silica ($SiO_2$),
a polar inorganic powder, bound to plastic or glass.

**Step 3**

We use thin glass spotting tubes to “spot” our TLC plate. It is important to
not overload or underload the place. For this reason, we use a dilute solution
of analyte and check after each application under a UV lamp.

Eluent moves up the TLC plate by capillary action.

As it does, the analytes spotted onto the plate equilibrate between the eluent, or mobile phase,
and the silica, or stationary phase.

Silica ($SiO_2$) is exceedingly polar compared to the eluent in every case.
As such, **less polar compounds** will spend **more time moving** within the **eluent mobile phase**.
**More polar compounds** will spend **more time stationary** in the **stationary silica phase**.

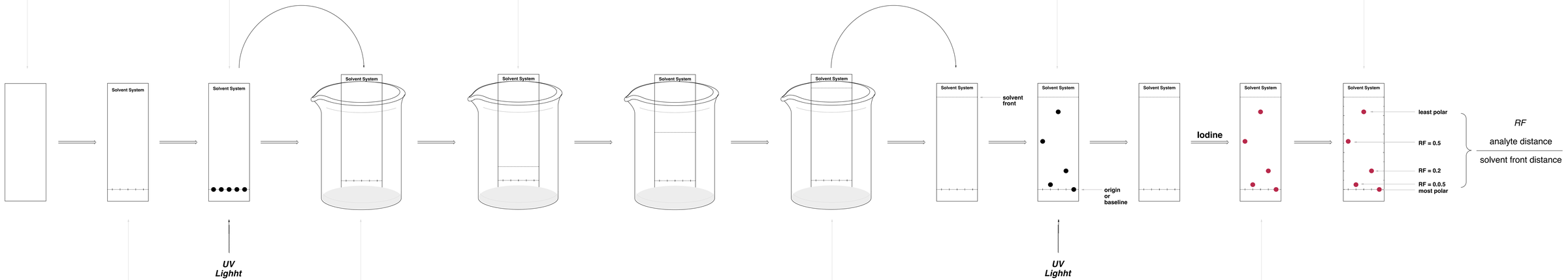
Therefore, less polar compounds move further up the plate than more polar compounds do.

**Step 5**

You will notice we cannot directly see where the analytes have moved to on the plate.
We visualize the TLC plate using UV light; many compounds with pi systems (double bonds, etc) will absorb UV light.
Because the silica is fluorescently doped, wherever an analyte that can absorb UV light is will appear dark.
We circle the dark spots with a pencil so that we may see them once the UV light is removed.

**Step 7**

We use compounds’ RF values to make predictions about their polarities and,
if we have a standard to compare unknown analytes to, their identities.




$$RF = \frac{\text{analyte distance}}{\text{solvent front distance}}$$

**Step 2**

We mark the origin with a line and place tick marks for each analyte.
It is important to place the origin high enough on the plate such that
it does not go below the solvent in the chamber.

We also write which solvent system we will use near the top of the plate.

*This is done with penil. Pen ink would dissolve and separate!*

**Step 4**

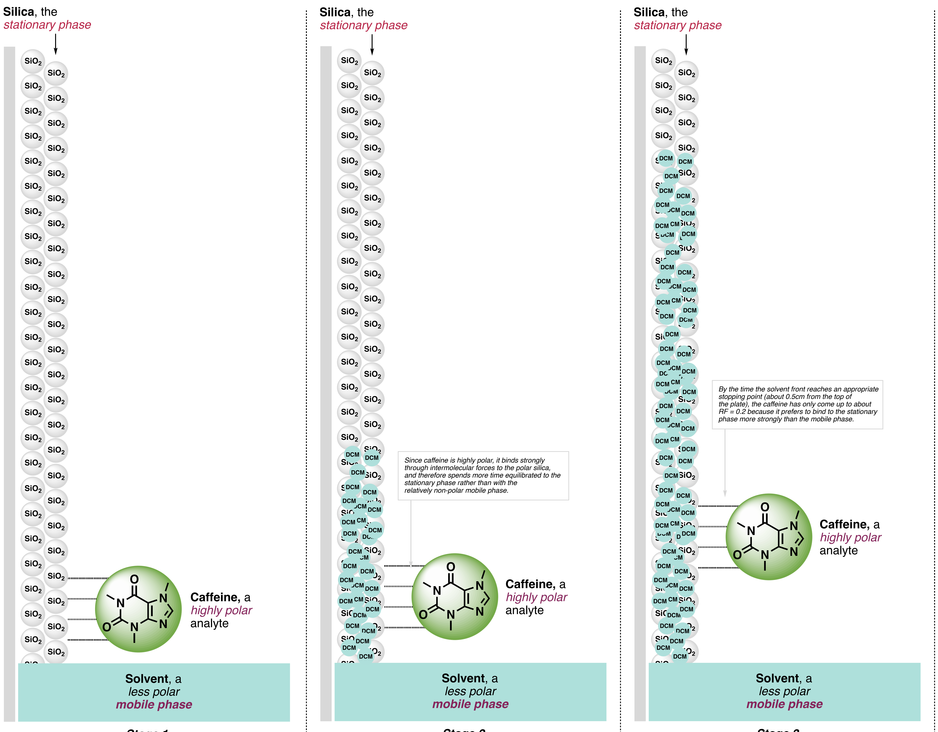
We place the loaded TLC plate into the developing chamber containing solvent or *eluent.*

Once the solvent front nears the top of the plate, we carefully remove the TLC plate from the developing chamber,

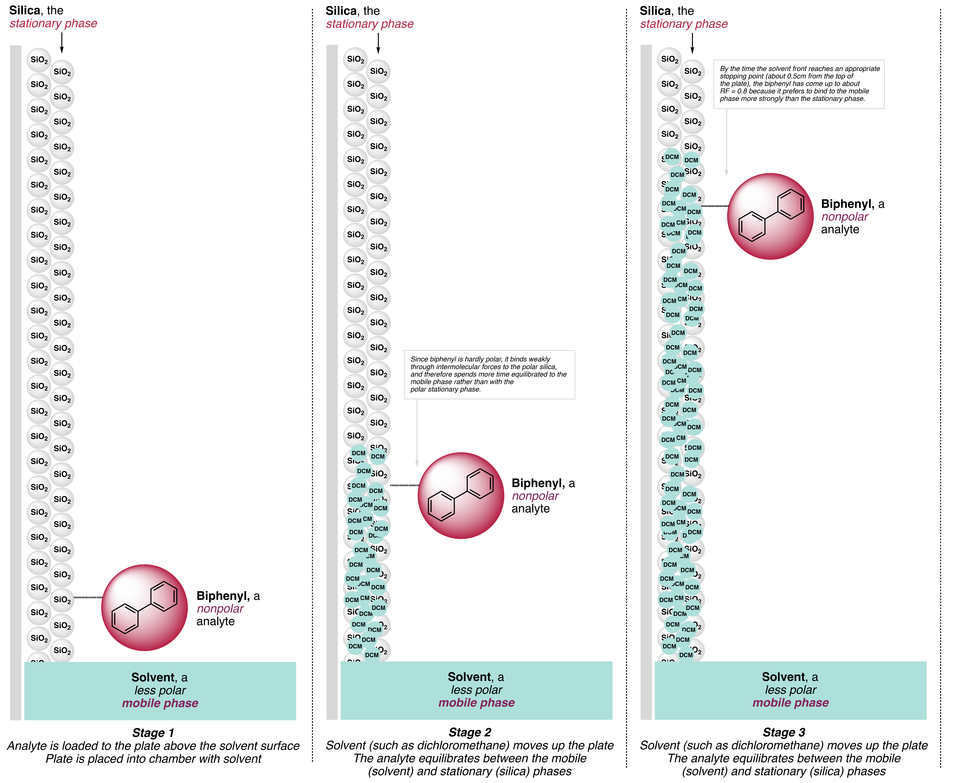
**Step 6**

UV light will not be absorbed by all compounds, so we also use a *stain* (in this case, Iodine) to chemically alter the spots such that they can be seen with the naked eye colorimetrically.

## TLC Case 1; a polar analyte




## TLC Case 2; a non-polar analyte




## TLC Case 3; polar and non-polar analytes, polar solvent