The Reaction Didn’t Work

“No Reaction”

The Reaction Didn't Work

"No Reaction"

There is NO SUCH THING as "No Reaction"

Ways to increase a reaction rate:

1. Higher concentration (e.g., 1M)
2. More reagent (higher concentration of reagent)
3. Higher temperature
4. Longer reaction times

At sufficient concentration, temperature, and time, any two chemicals will react!

The Reaction Didn't Work

"No Reaction"

Are you sure the SM spot on TLC isn't the product?

Are you sure the product isn't on the baseline?

Did you re-isolate the SM and NMR it?
...and calculate % recovery?

Did you run a control experiment to check your reagents, procedure, and technique?

The Reaction Didn’t Work

“Decomp”

The Reaction Didn’t Work

“Decomp”

There is NO SUCH THING as “Decomposition”

This means that you didn’t isolate one of the many products!

The Reaction Didn't Work

"Decomp"

What if the reaction worked, but you...

Misinterpreted the TLC plate:

Are you sure the product doesn't have the same Rf as the SM?

Are you sure the product isn't on the baseline (more polar than you anticipate)?

How many solvents systems have you actually tried? Stains?

Did you do a 2D-TLC to check for reaction w the plate?

The Reaction Didn't Work

"Decomp"

What if the reaction worked, but you...

Destroyed/lost the product

Is the compound stable to silica?
(2D TLC, re-chromatograph a pre-weighed sample of product)

Is the compound in the aqueous layer (TLC check)?

Did you neutralize your $CDCl_3$ by passage through basic Al_2O_3?

The Reaction Didn't Work

"It only gave 10% yield"

What's the mass balance?

What is the crude mass?

Does the crude NMR show the product?

Did you use an internal NMR standard (CH_2Br_2)?

How did you work up the reaction?

Is the product bound to the reagent (like DIBAL)?

The Reaction Didn't Work

"I lost it on the column"

Are you sure?

Did it perform well on TLC? 2D TLC?

Did you flush the column with a polar solvent?

Did you include 2% Et_3N with your eluent?

Did you include 2% HOAc with your eluent (for acids)?

The Reaction Didn't Work

"I didn't get the reported yield"

Why not?

Did you TLC the reaction immediately?

Don't say this: "They said it took 48 hours..."
How do you know it wasn't done after 5 min?

Is your substrate EXACTLY the same?

Are the conditions EXACTLY the same?

The Reaction Didn't Work

"I can't get it clean (by FCC)"

Why not?

How many solvent systems have you tried?

Did you try HPLC? Reverse phase silica?

What scale are you working on?

Is it a solid? Or is it volatile?

Did you purify it on the same day you ran the reaction?

The Reaction Didn't Work

The only times "decomp" and "NR" are acceptable:

You have another set of conditions that successfully perform the desired transformation. Example:

"Swern works fine, but Dess–Martin gives decomp and MnO_2 gives no reaction"

The Reaction Didn't Work

The only times "decomp" and "NR" are acceptable:

You conducted a control experiment from the literature, got the reported yield, and ran the desired reaction side-by-side. Example:

"I prepared the exact starting material from the Proctor paper, and it reacted with SmI_2 in 75% yield (they report 78%). Side-by-side, I ran my substrate on the same scale, same concentration, same temperature, etc. I observed no reaction (or more than 10 spots by TLC)."