

## Temperature control: one of the important factors in organic syntheses

### 1. Chiller



1. precise control of the temperature
2. we have 3~4 chillers...

### 2. acetone/dryice bath with thermometer



1. need to keep adding dryice
2. precise control is difficult

## Organic solvent/dry ice system: effective but...

temp.	composition
0 °C	crushed ice
-40 °C	MeCN/CO <sub>2</sub> (s)
-78 °C	acetone/CO <sub>2</sub> (s)
-95 °C	acetone/liq N <sub>2</sub>
-98 °C	MeOH/liq N <sub>2</sub>
-130 °C	pentane/liq N <sub>2</sub>

How about other temperatures? →

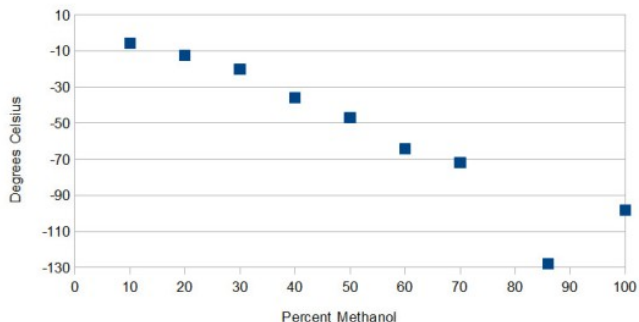
temp.	composition
0 °C	crushed ice
-10 °C	MeCN/CO <sub>2</sub> (s)
-23 °C	CCl <sub>4</sub> /CO <sub>2</sub> (s)
-30 °C	o-xylene/CO <sub>2</sub> (s)

MeOH is much cheaper than acetone

toxic and expensive solvents are required to make cooling bath

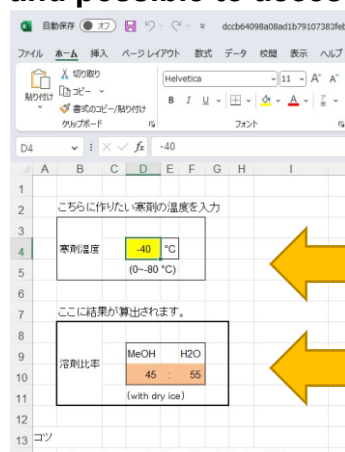
<https://www.shenvilab.org/education>

## MeOH/water/dryice system: easy to control the temperature and possible to access various temperature



How to predict MeOH/water composition?

Figure 1. MeOH/water cooling system.



1. cheap methanol
2. reusable
3. various range from -78 to 0 degrees

put the temperature you need

give MeOH/water composition automatically!

Figure 2. excel calculator.