

# CENG 343

## COLORFUL KINETICS EXPERIMENT

### Experimental Procedures

#### A. IDENTIFY COMPONENTS AND THEIR CONTROLS:

- (a) Constant temperature bath.
  - ON-OFF switch;
  - preset temperature selection knob;
  - temperature selection dial.
- (b) Jacketed batch reactor.
- (c) Magnetic stirrer.
  - RPM and enter buttons;
  - Start/stop button.
- (d) Sampling pump
  - FORWARD - OFF - REVERSE switch
- (e) Sampling loop lines and flow-through cell.
- (f) Spectrophotometer.
  - set ref button;
  - wavelength and absorbance LED panels.
- (g) Temperature sensors and temperature indicator panels.
- (h) Second peristaltic pump for emptying reactor and bath.

#### B. BEFORE YOUR FIRST RUN:

1. Turn the constant temperature bath OFF and carefully remove the temperature sensor and the bath lid.
2. Empty the constant temperature bath using the peristaltic pump.
3. Fill the bath with 3.5 liters of deionized water.
4. Replace the bath lid and put the temperature sensor in place. It should not touch the bottom of the bath.
5. Turn the temperature selector knob to position A and turn the bath ON. After several minutes the bath temperature should stabilize at about 29 °C.

#### C. THE FIRST RUN:

6. Fill the reactor with 400 ml deionized water.  
Start the stirrer (at 450 rpm).  
Start the circulating pump by turning the switch to the REVERSE position.
7. After pumping water through the sampling loop for a couple of minutes, stop the sampling pump and the stirrer.
8. Empty the reactor using the second peristaltic pump.

9. Start the sampling pump to empty the sampling loop.
  10. Stop the sampling pump and remove the last traces of water from the reactor.
  11. Fill the reactor with 300 ml of KOH solution.
  12. Start the sampling pump again and let it go for a couple of minutes to remove all air bubbles from the sampling loop.
  13. When the bubbles are gone, zero the spectrophotometer by pressing the **SET REF** button.
  14. On the computer panel, SPECIFY A UNIQUE FILE NAME, make sure the wavelength is set to 555 nm and start the data acquisition program.
  15. Make sure the reactor temperature has stabilized!
  16. Inject 250 microliters of phenolphthalein solution to the reactor.
  17. At the time of injection, **push** the injection button on the computer panel.  
**Keep the mouse button depressed until the computer beeps.**  
Release the mouse button.
- NOTE: This will put the marker  
**Phenolphthalein injected**  
in the file containing the data from this run.
18. Let the program run until you reach equilibrium. Change the scale of the absorbance strip chart to watch small changes in absorbance.
  19. Stop the program and **COPY** the data file for your run to a floppy disk.  
NOTE: The data file is in the folder 'Results' that is located inside the folder 'SPEC.'
  20. Empty the reactor.

#### D. THE SECOND RUN:

21. Turn the bath temperature selector knob to position B. After several minutes, the bath temperature should stabilize at about 36 °C.
22. Repeat steps 6 through 13 to rinse the reactor and fill it with fresh KOH.
23. Specify a NEW file name and repeat steps 15 through 20.

#### E. THE THIRD RUN:

22. Turn the bath temperature selector knob to the last (unmarked) position. Using the temperature selector knob, set the temperature to about 43 °C.  
After several minutes, the bath temperature should stabilize at the new temperature.
23. Repeat steps 6 through 13 to rinse the reactor and fill it with fresh KOH.
24. Specify a NEW file name and repeat steps 15 through 20.
25. If you are the last group for the day, shut everything off.