

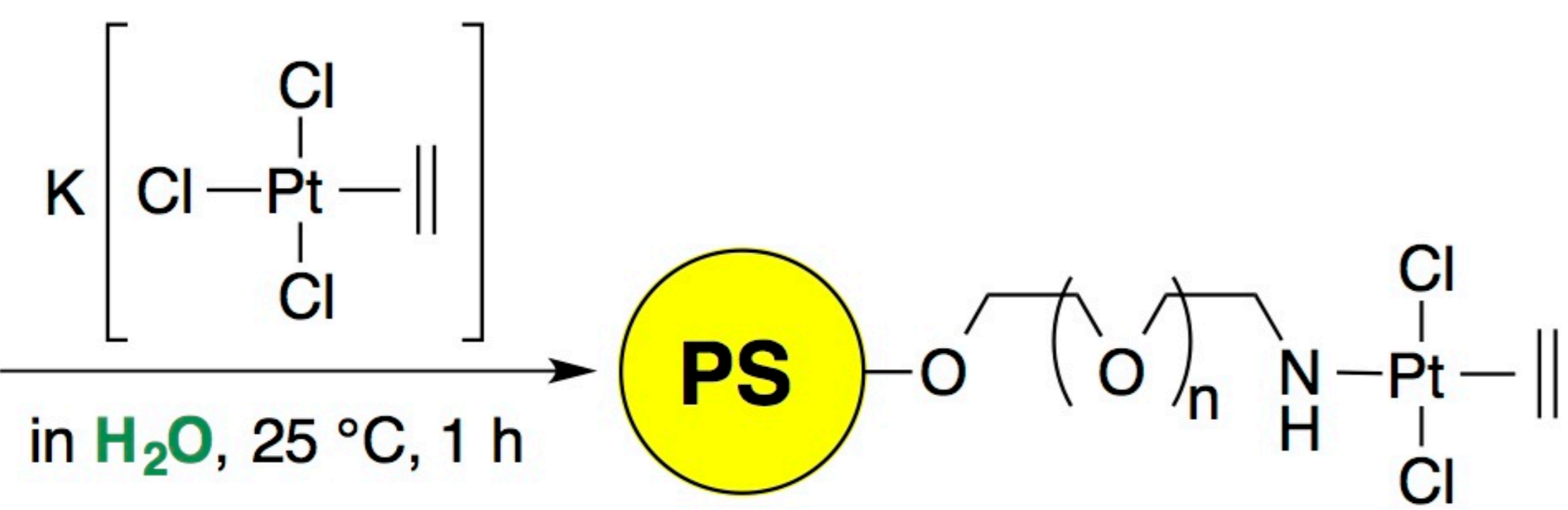
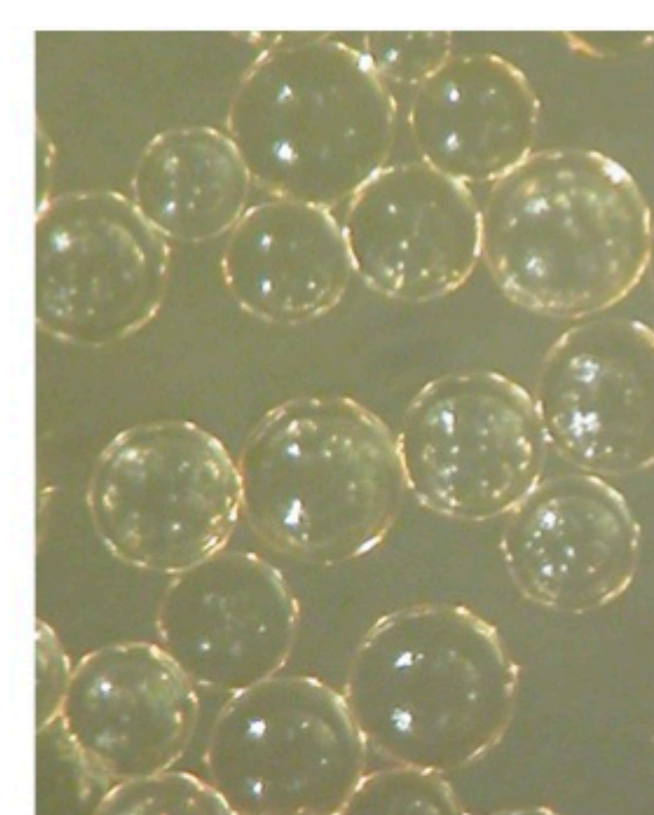
# Polymer-Supported Pt NPs for Flow Hydrogenation and Aerobic Oxidation



Yasuhiro UOZUMI, Institute for Molecular Science

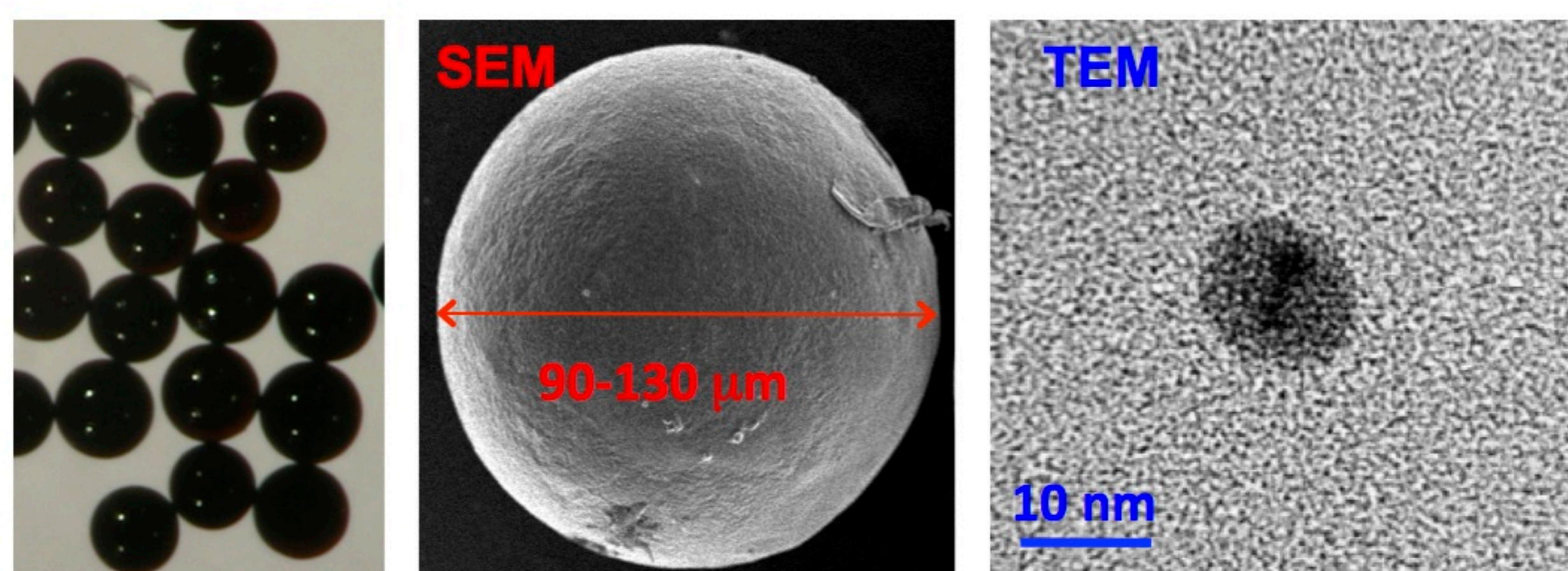
## PS-PEG-supported nano-Pt

## flow apparatus

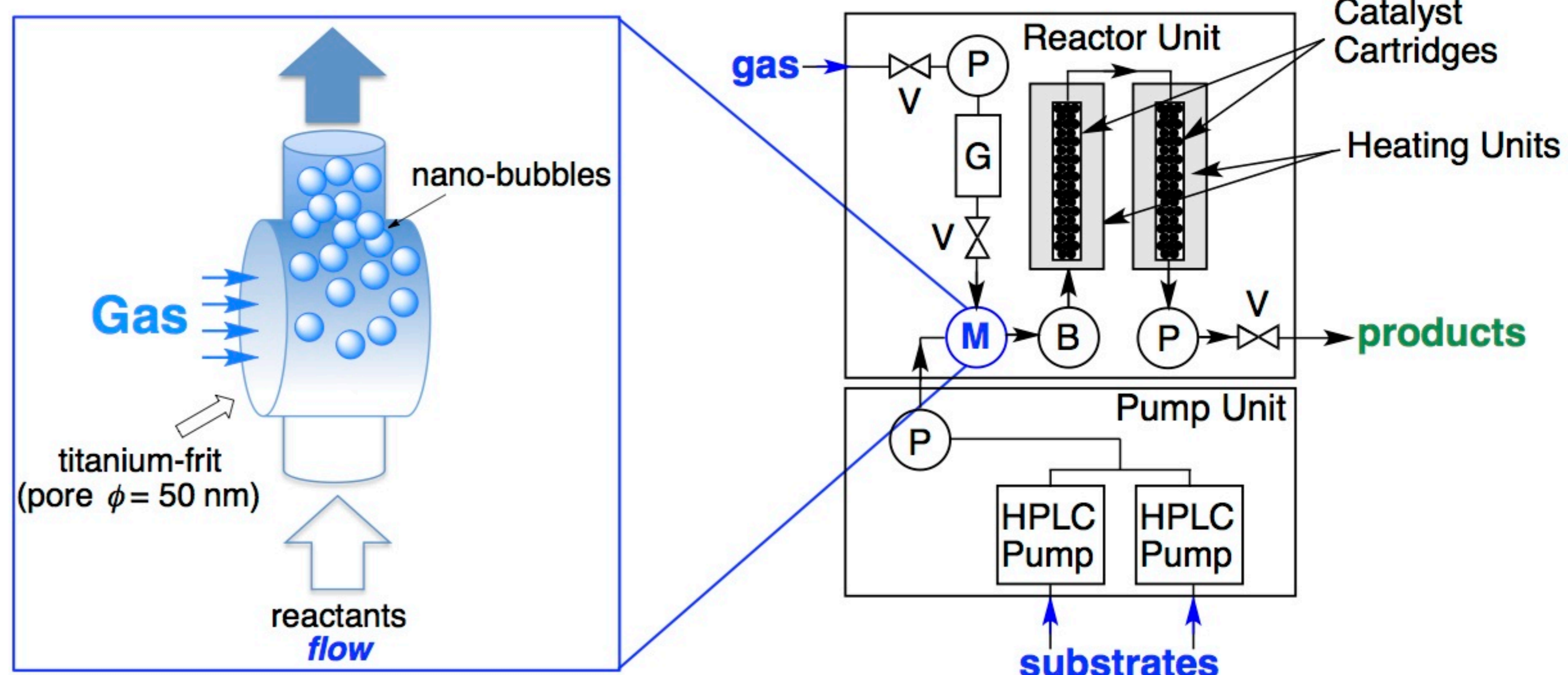


PS-PEG-NH<sub>2</sub>

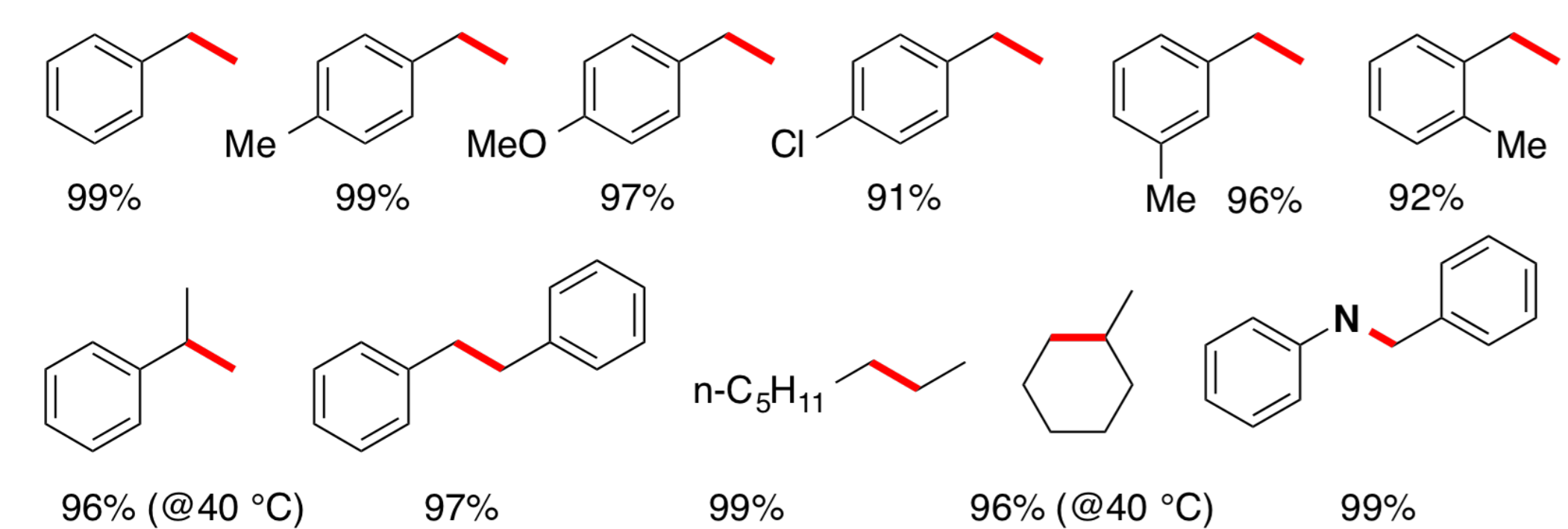
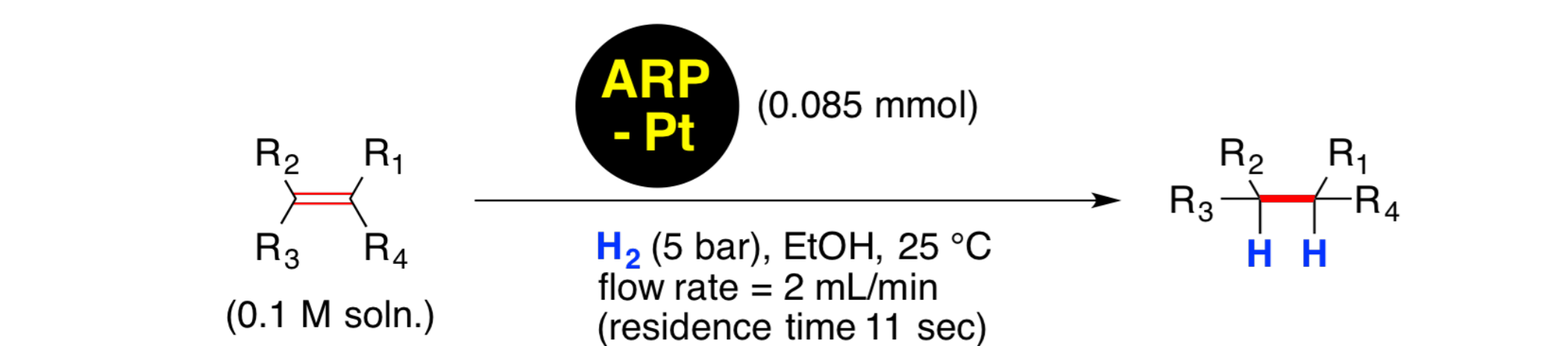
C<sub>6</sub>H<sub>5</sub>CH<sub>2</sub>OH  
in H<sub>2</sub>O, 80 °C



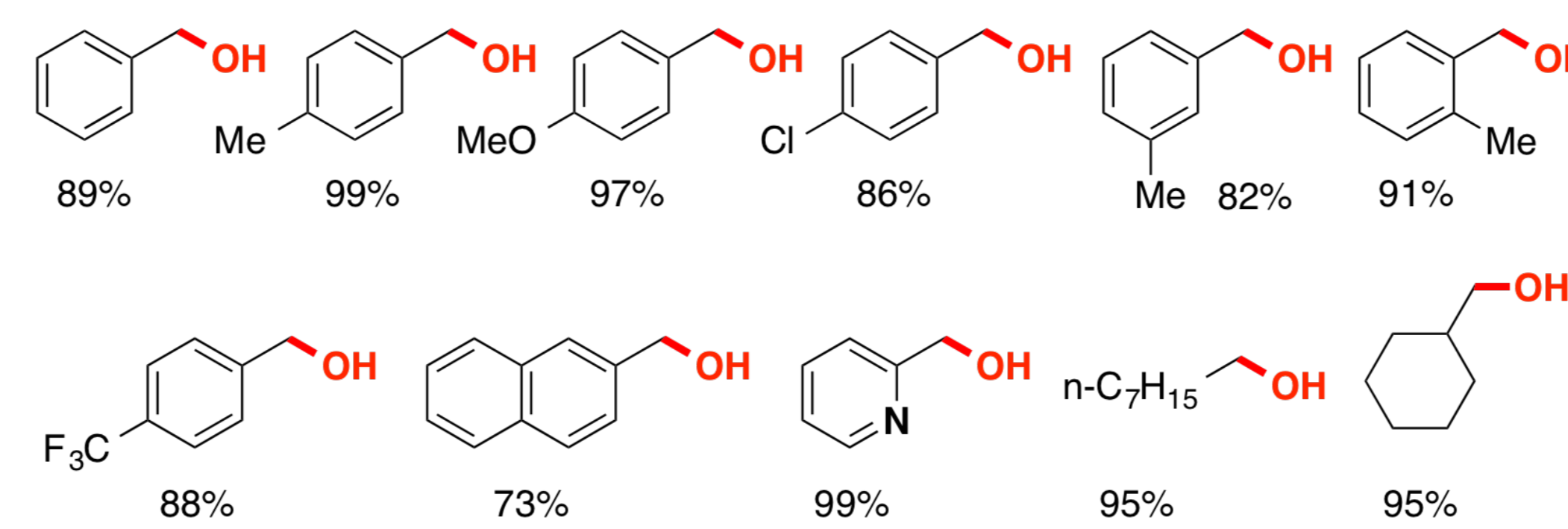
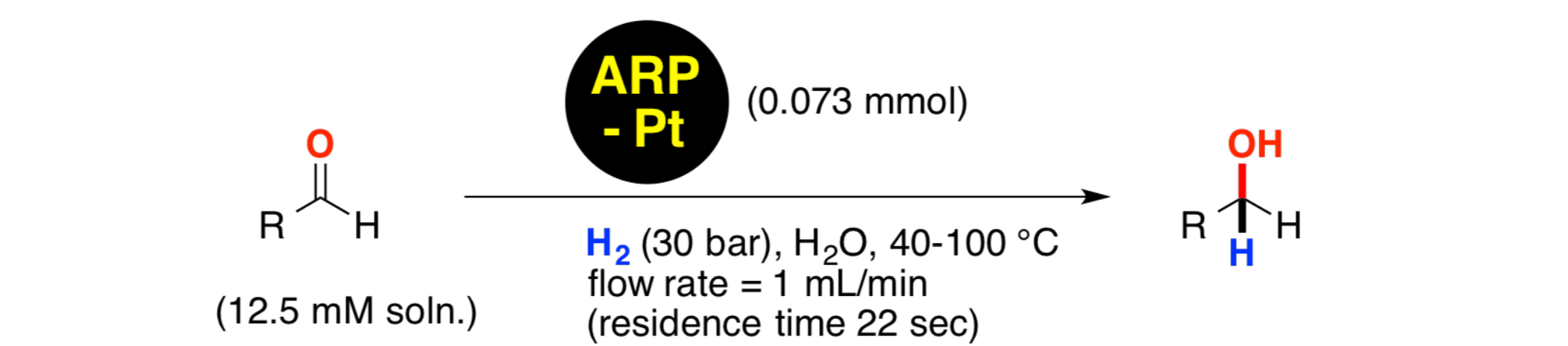
ARP-Pt (ARP = Amphiphilic Resin-Dispersed Particles)



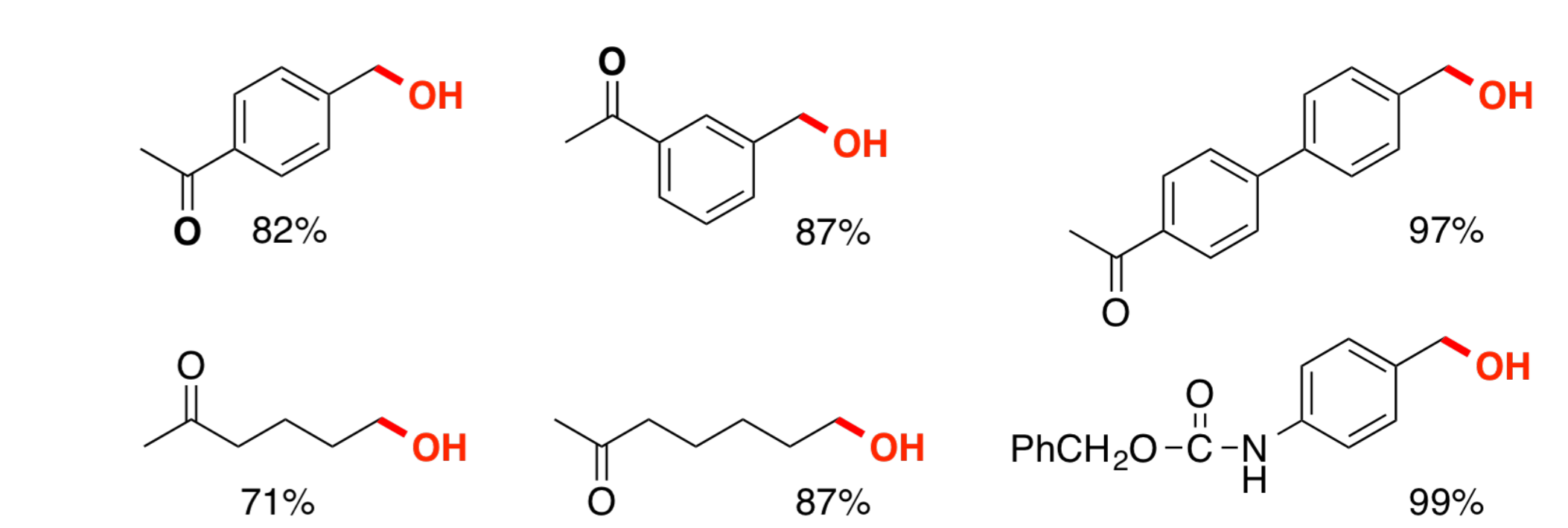
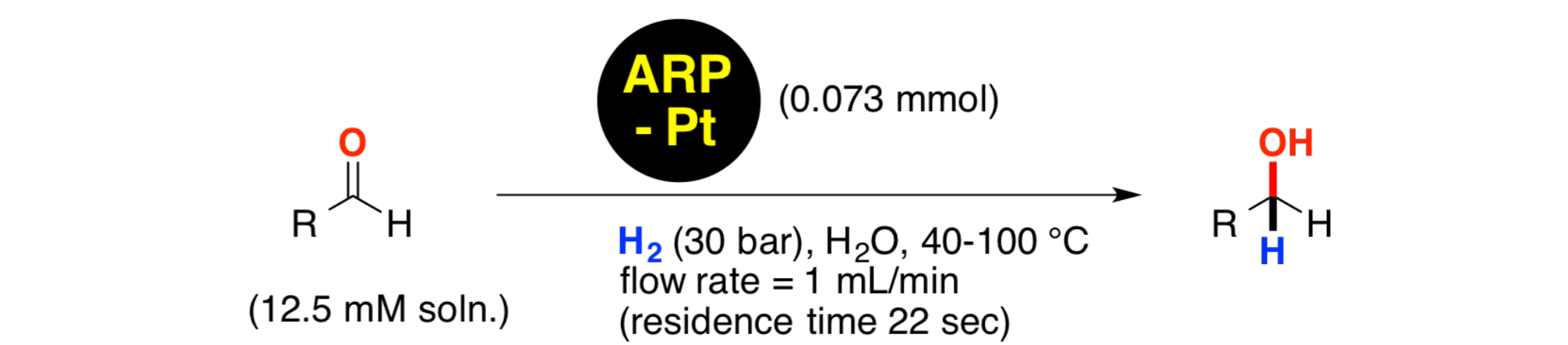
## olefin hydrogenation



## carbonyl hydrogenation

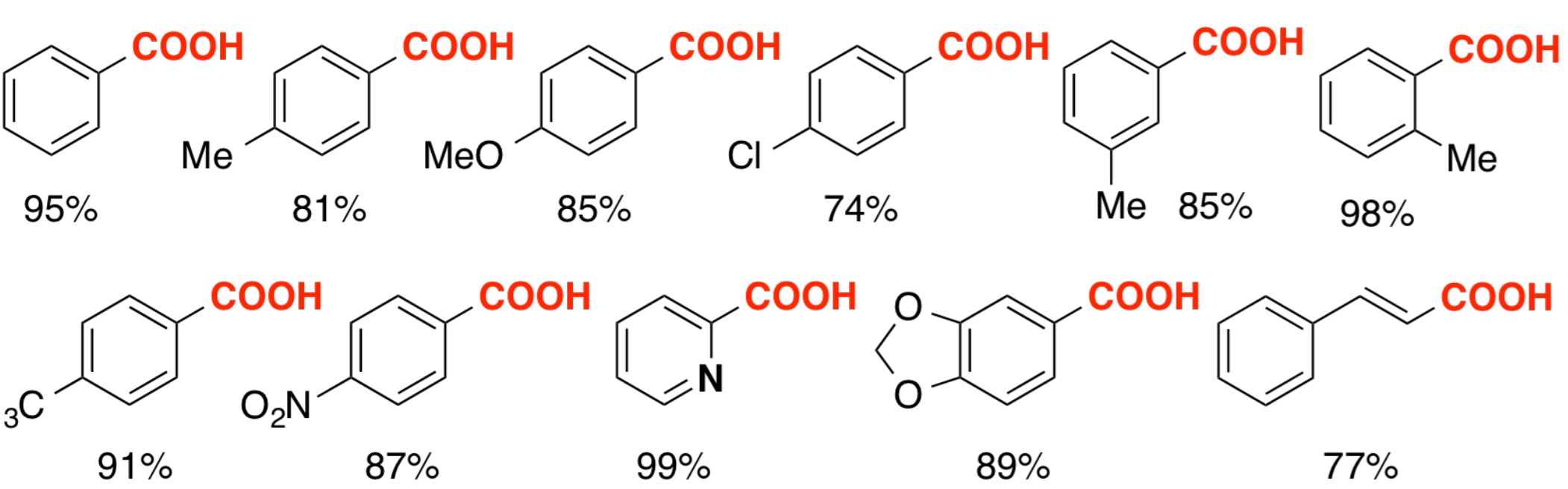
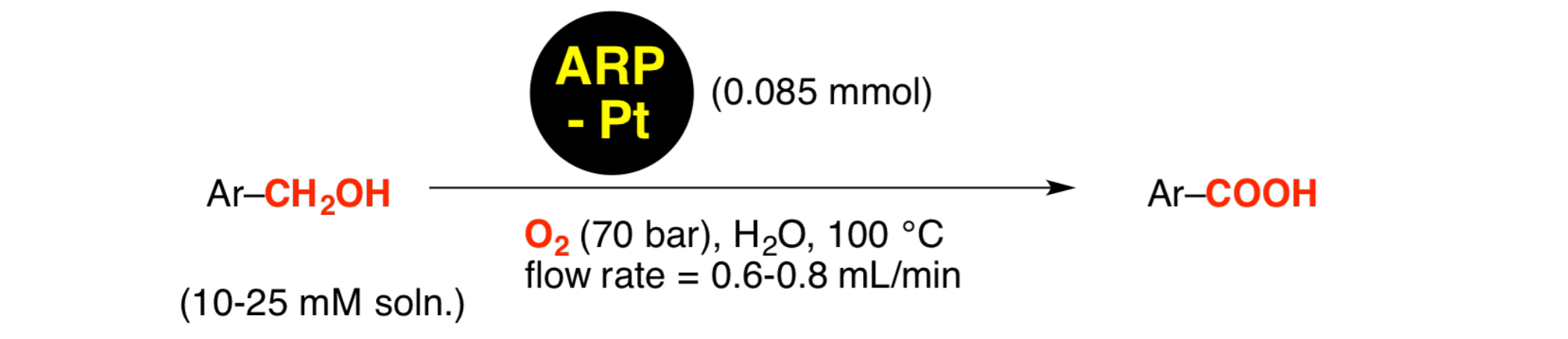


## chemo-selective hydrogenation

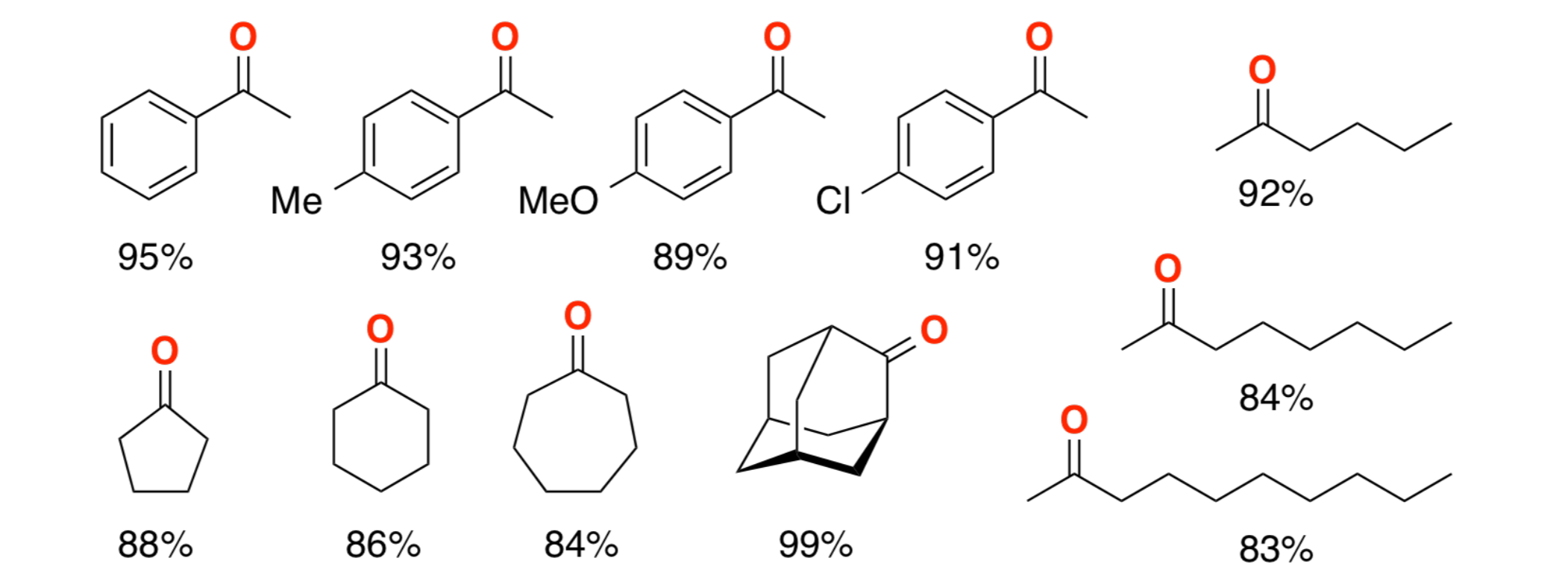
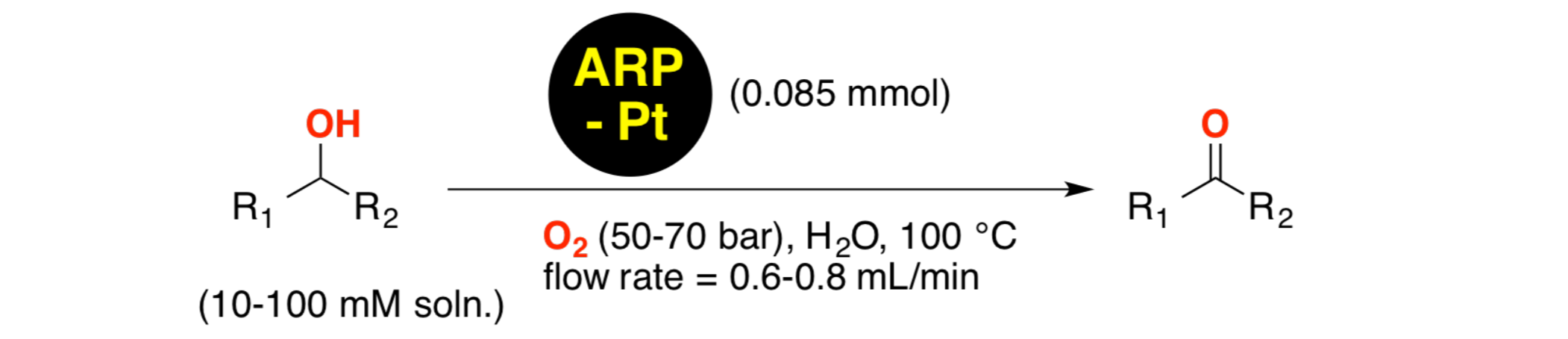


Org. Lett. 2005 (Pd); RCA Adv. 2015 (flow); ACS Catal. 2017

## aerobic oxidation (1)



## aerobic oxidation (2)



Org. Lett. 2005 (Pd); ACIE 2007 (Pt); RCA Adv. 2015 (flow)

## commercial catalog

富士フイルム 富士フイルムと光純薬株式会社 試薬

両親水性ポリマー担持触媒  
ARP白金 (ARP:Amphiphilic Resin Particles)

概要 詳細 製品一覧

polystyren-polyethylene glycol (PS-PEG) に酸化白金を担持した不均一系触媒です。水系溶液中でアルコールの酸化反応が進行します。また、ポリマー担持型触媒のため、反応後の回収が容易で、繰り返し使用が可能です。

特徴

- 一つの触媒で酸素酸化、水素還元両方の反応が可能
- ポリマー担持型触媒のため、フロー合成への利用も可能
- 反応後の回収、再利用も可能

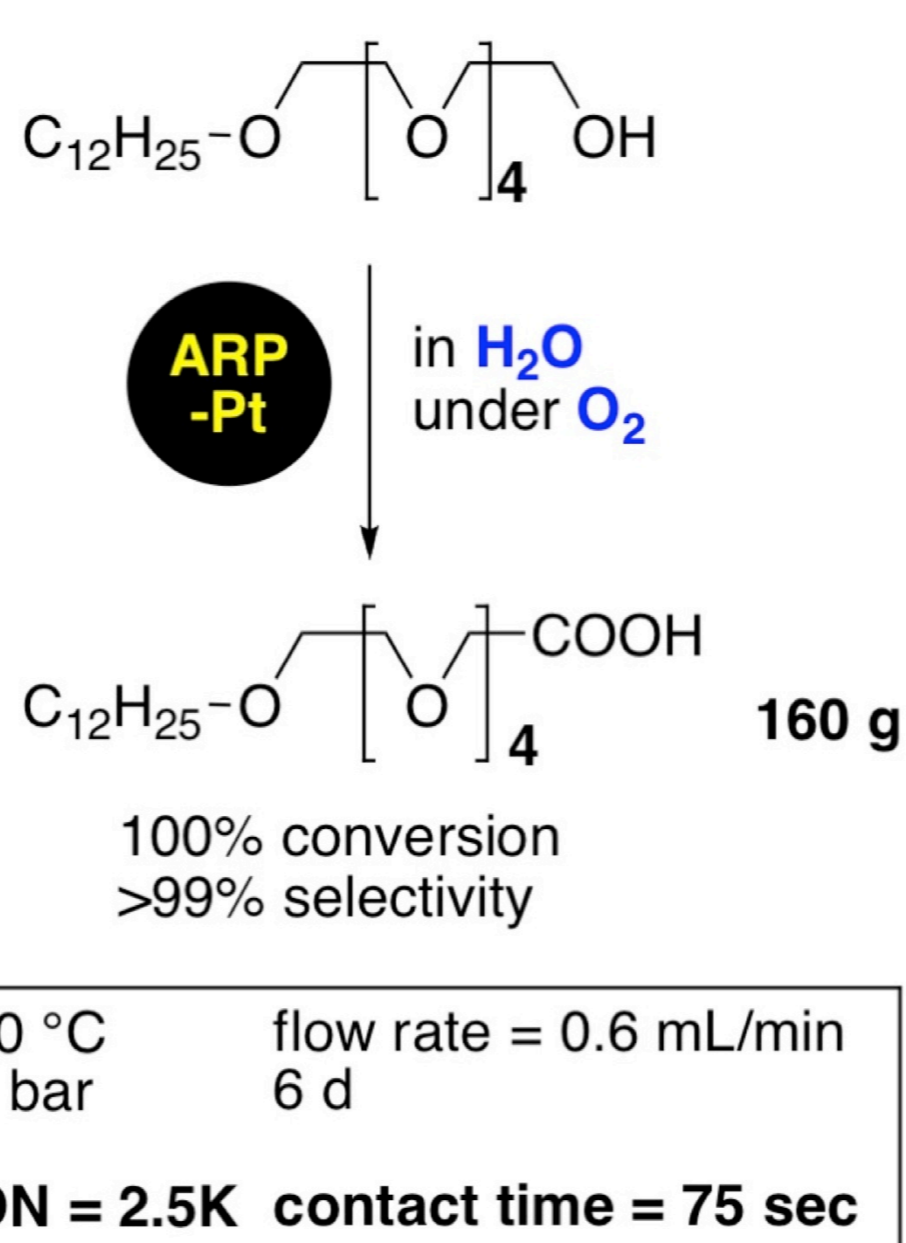
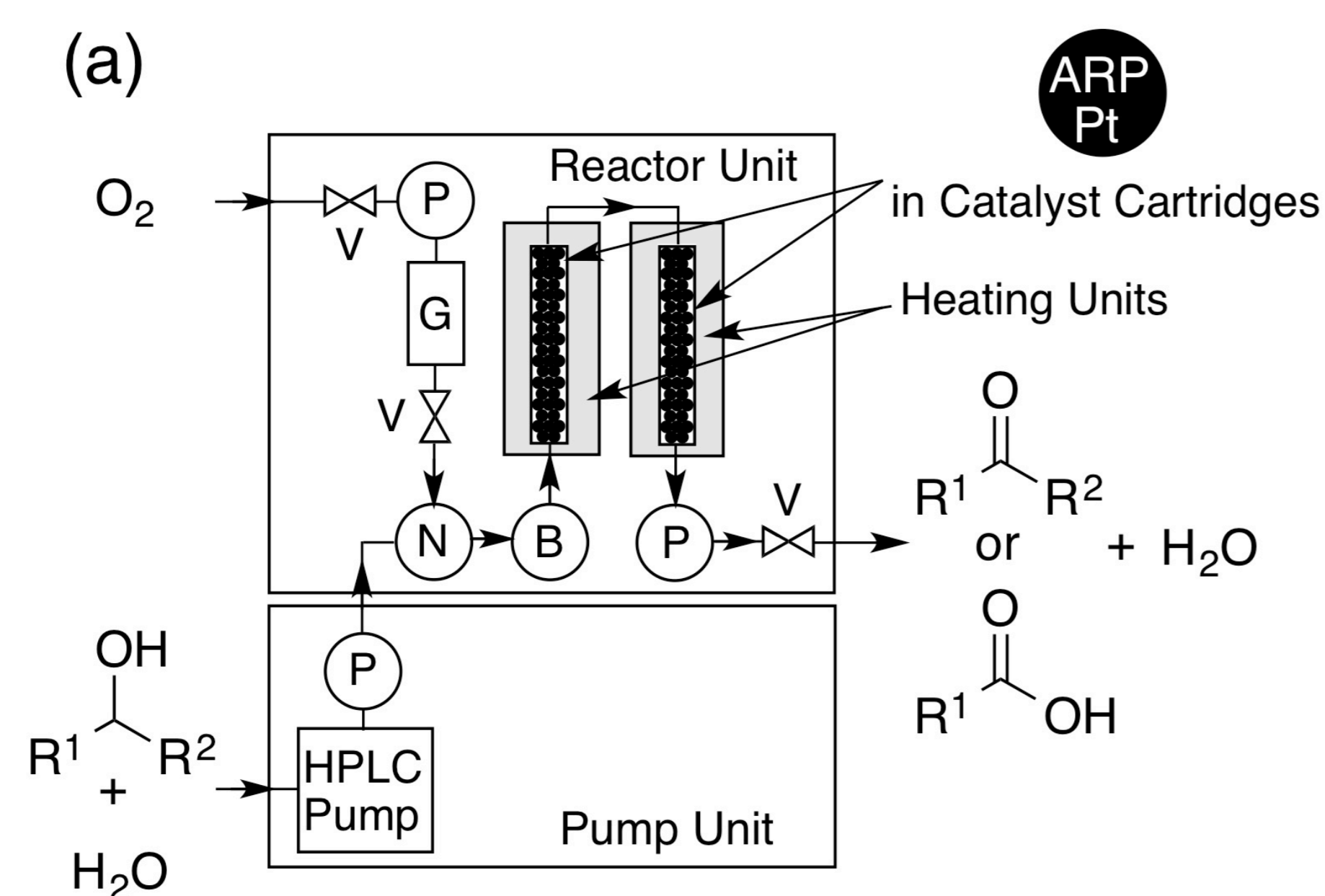
反応例

X-Cubeを利用した酸素酸化反応

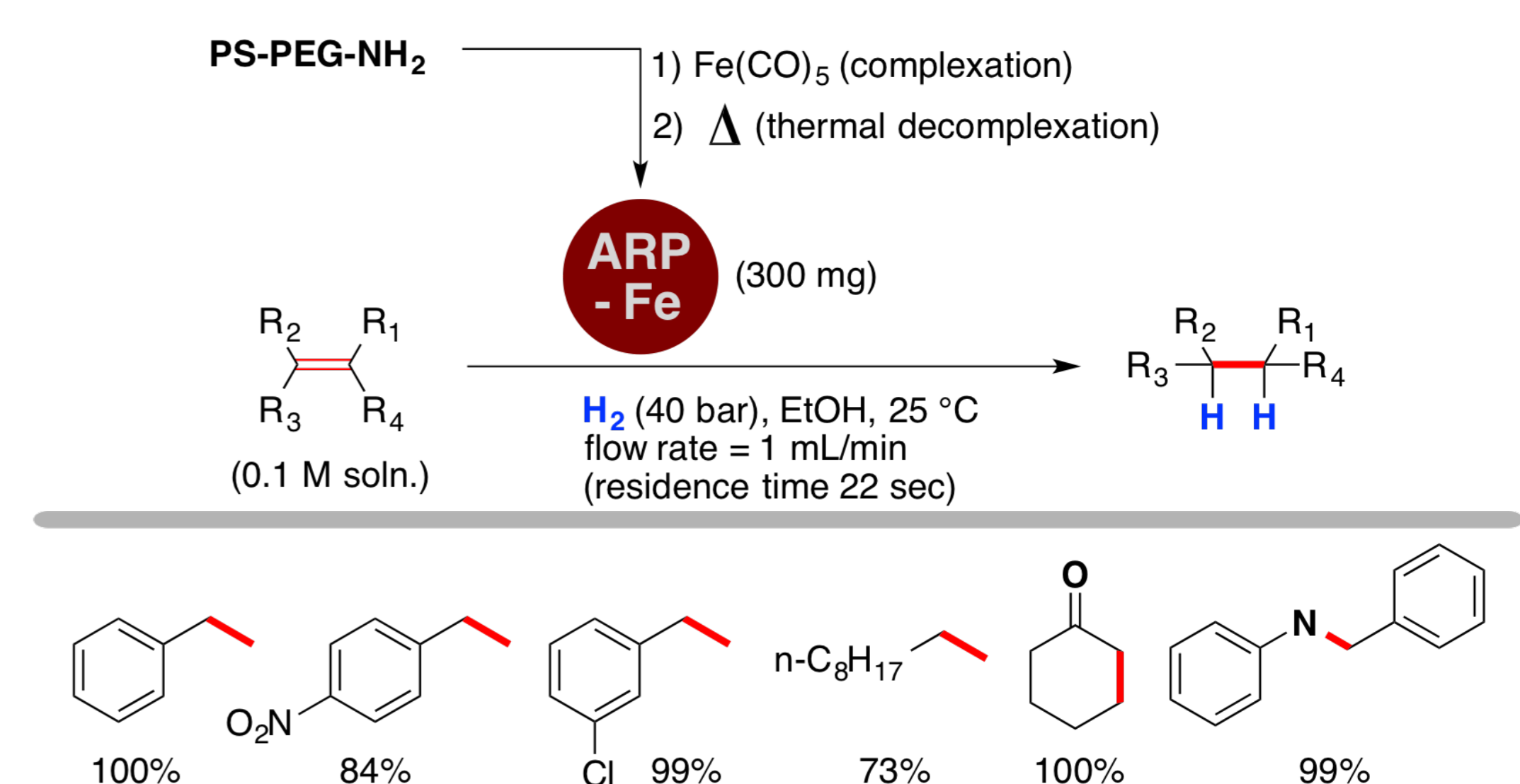
$$\text{R}^1-\text{CH}(\text{OH})-\text{R}^2 \xrightarrow[\text{O}_2 (50-70 \text{ bar}), 100^\circ\text{C}, \text{H}_2\text{O} \text{ or } \text{H}_2\text{O}/\text{tBuOH} (10-100 \text{ mM})]{\text{ARP-Pt (2 cartridges, 0.17 mmol Pt)}, \text{X-Cube flow-reactor}} \text{R}^1-\text{C}(=\text{O})-\text{R}^2 \text{ or } \text{R}^1-\text{CH}_2-\text{R}^2$$

(R<sup>1</sup> = alkyl, aryl; R<sup>2</sup> = H, alkyl, aryl; contact time 55-73 sec (flow rate 0.6-0.8 mL/min))

## large-scale application: anionic surfactant



## ARP-Fe catalysis



Green Chem. 2013