

# Elements of Success

## “Inserting the Nitrogen”

**ChemSource 2006**

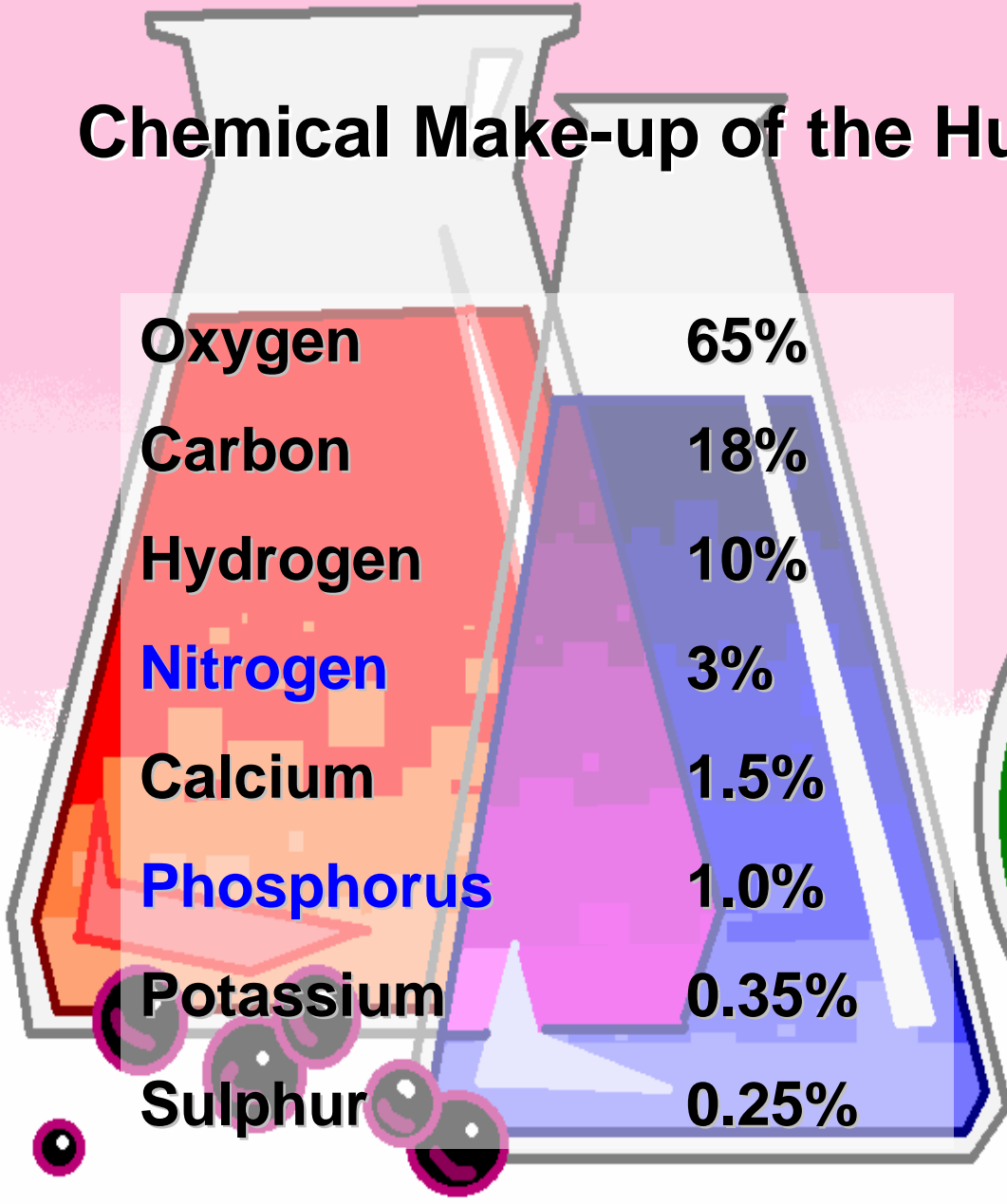
14 - 15 June 2006

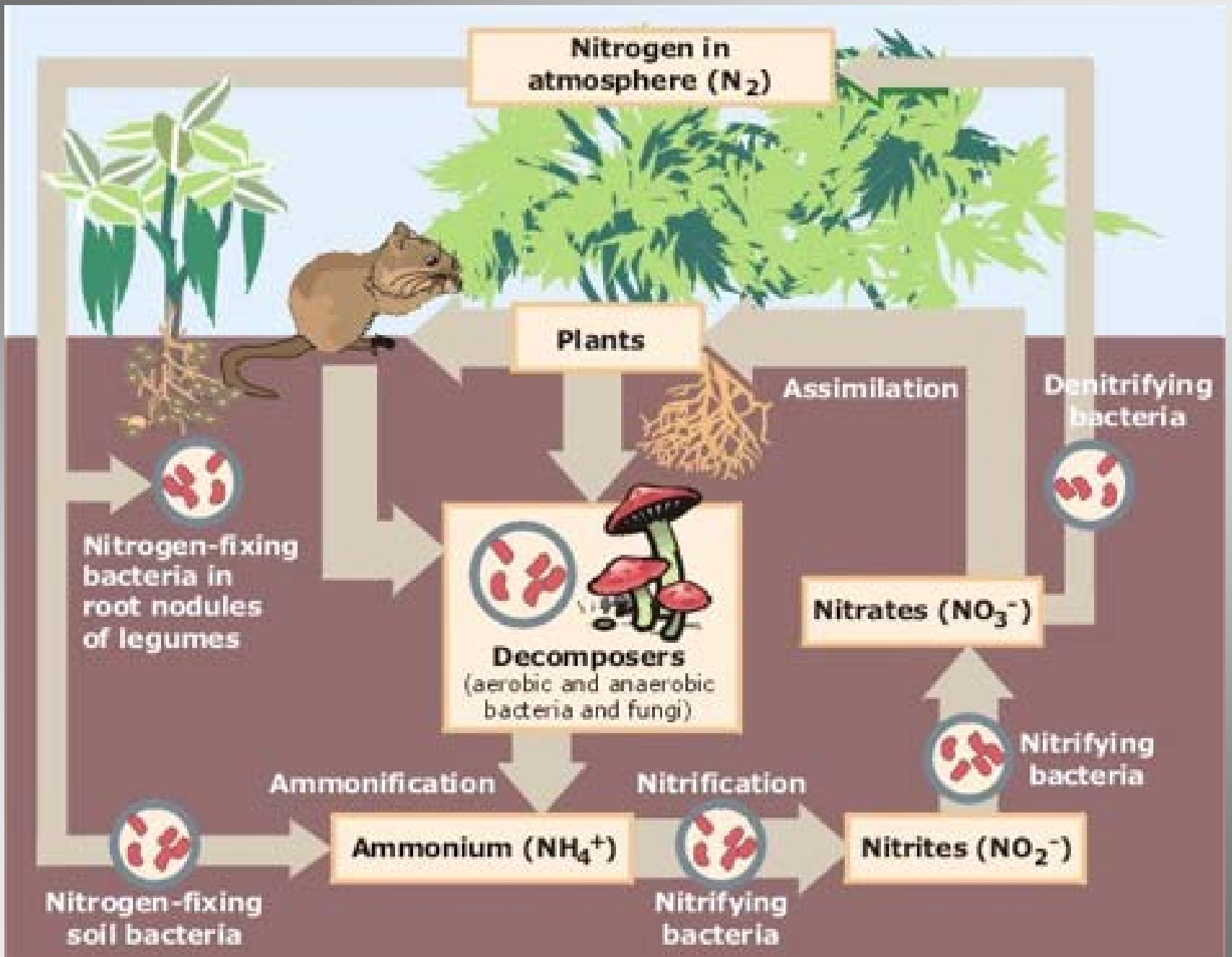
at Geneva PALEXPO, Switzerland

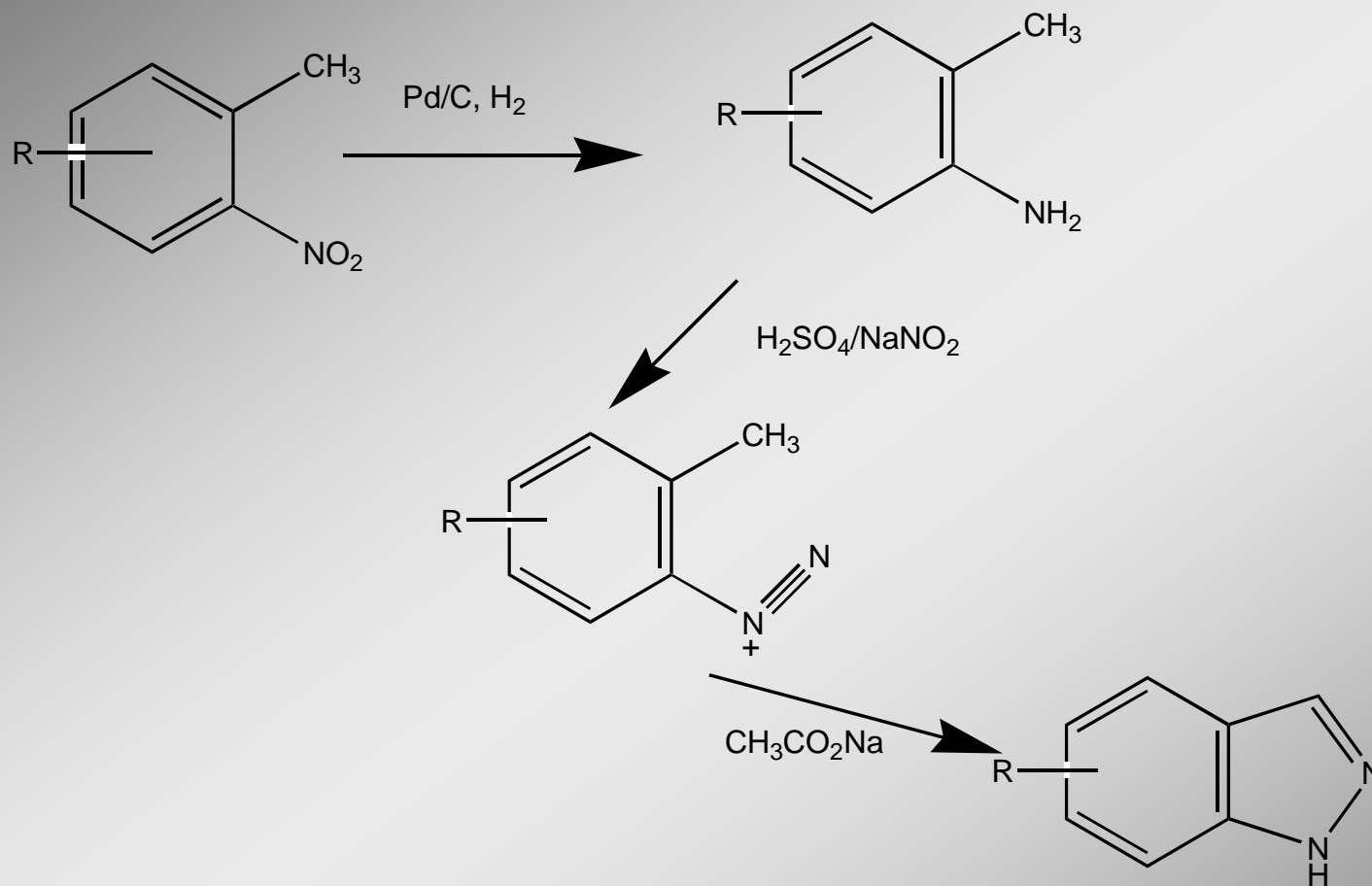
**Dr Malcolm J Braithwaite**

**exchem organics**

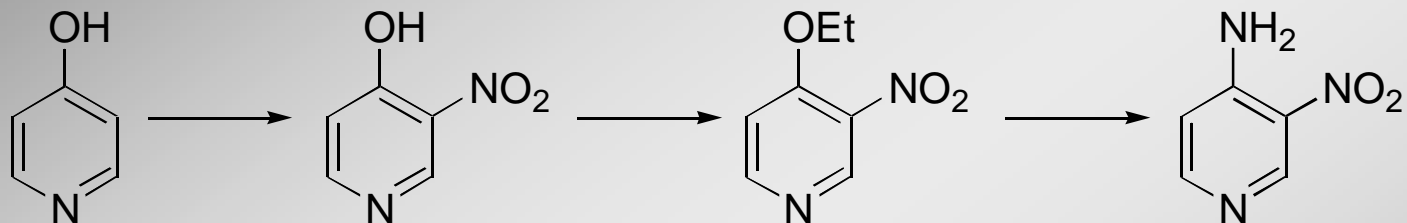
# Chemical Make-up of the Human Body



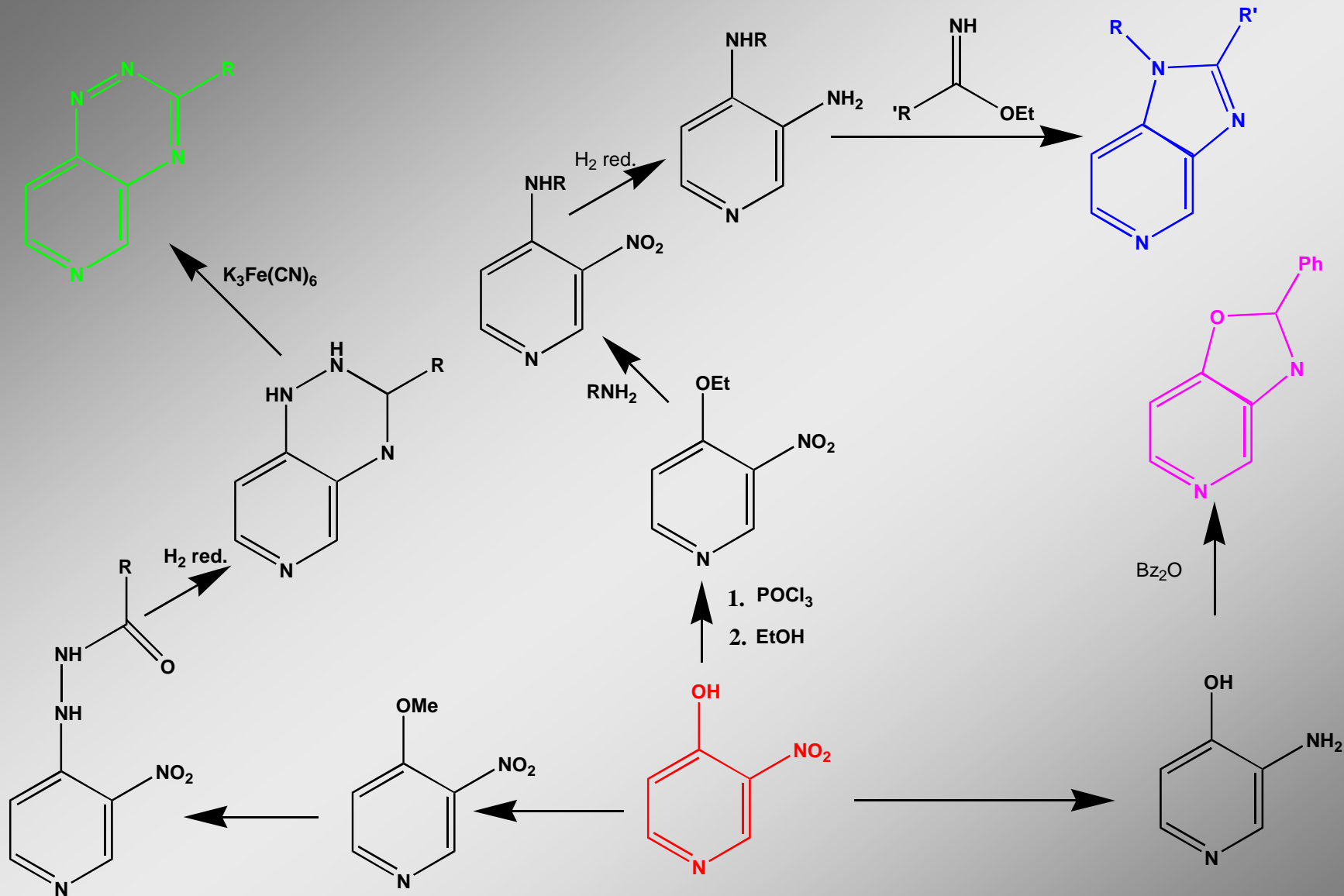




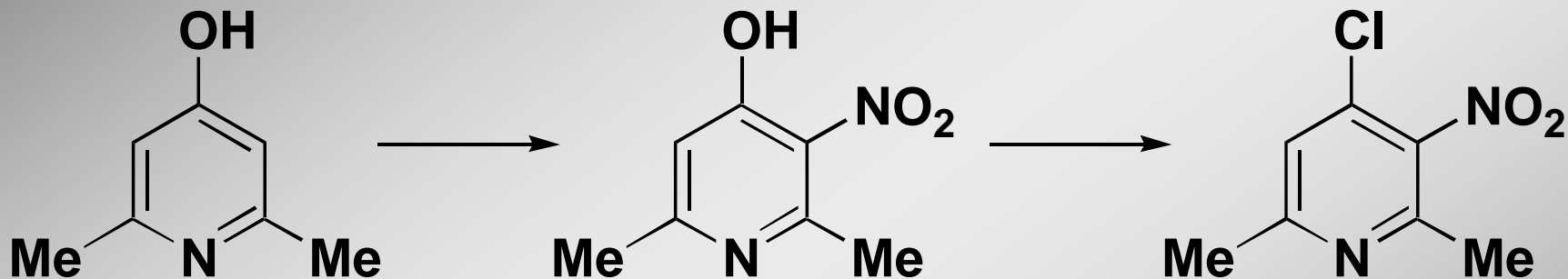
**Figure 1 “Inserting the Nitrogen”**



**Figure 2. Derivatisation of the Hydroxyl group**



**Figure 3. 4-Hydroxy-3-Nitropyridine Product Family Tree**



**Figure 4. Minimisation of Dinitration**

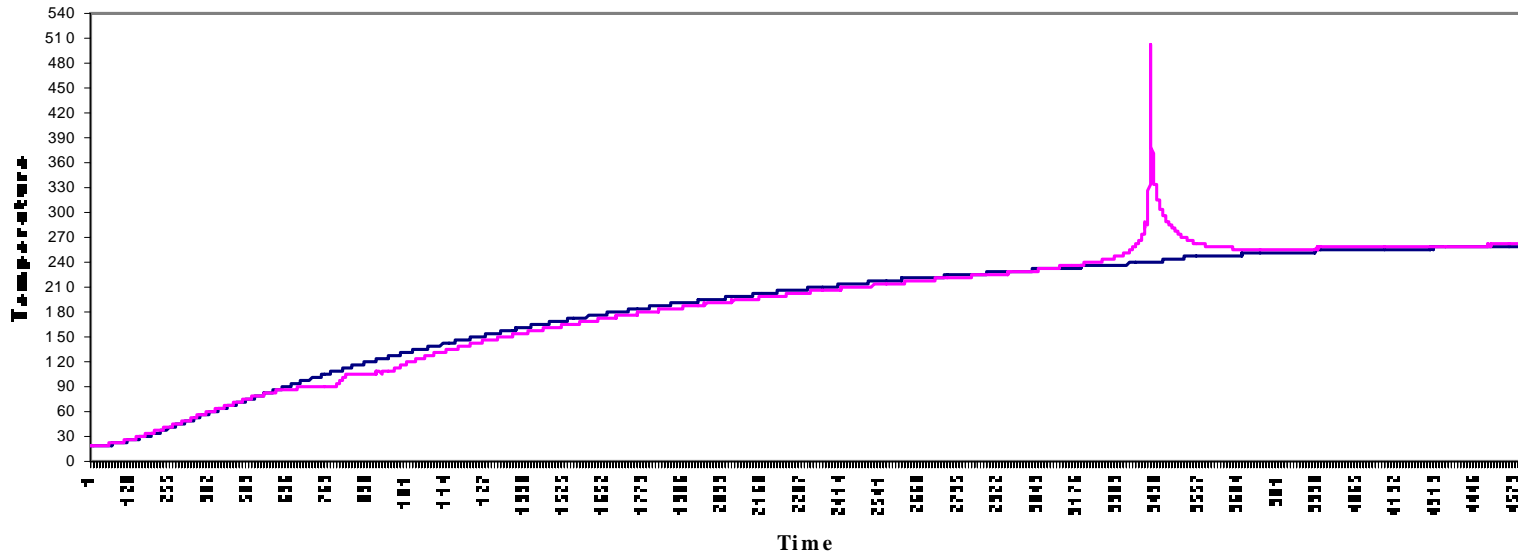
# Insulated Exotherm Test Equipment



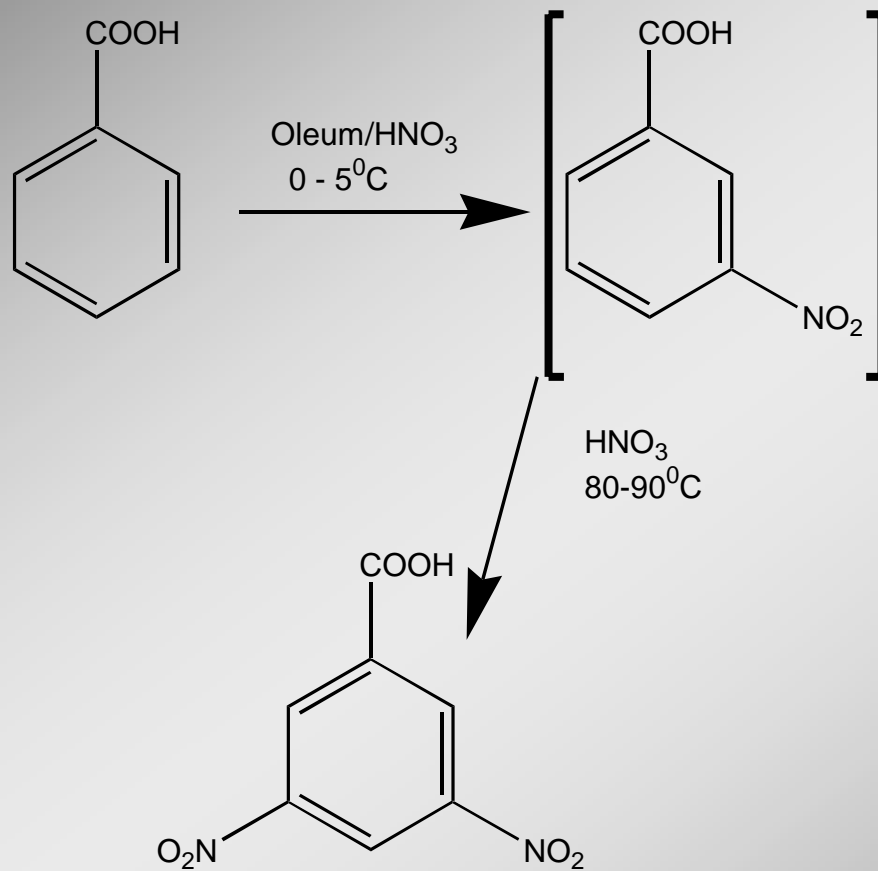
See John L Cronin & Philip Nolan, *Plant Operations Progress* 1987, 6.2, 89-97  
**Figure 5**



### P 2090 Methanol Damp

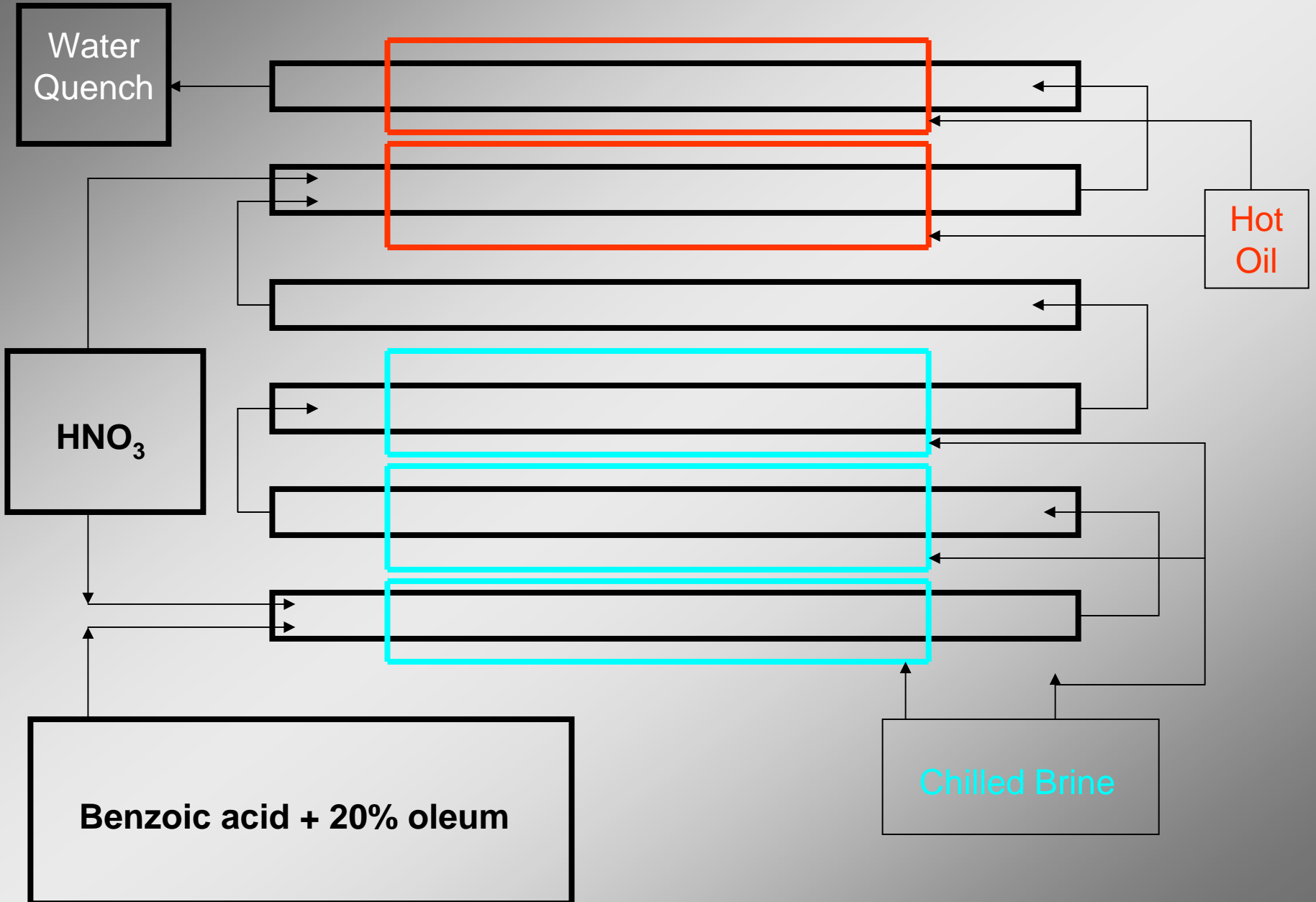


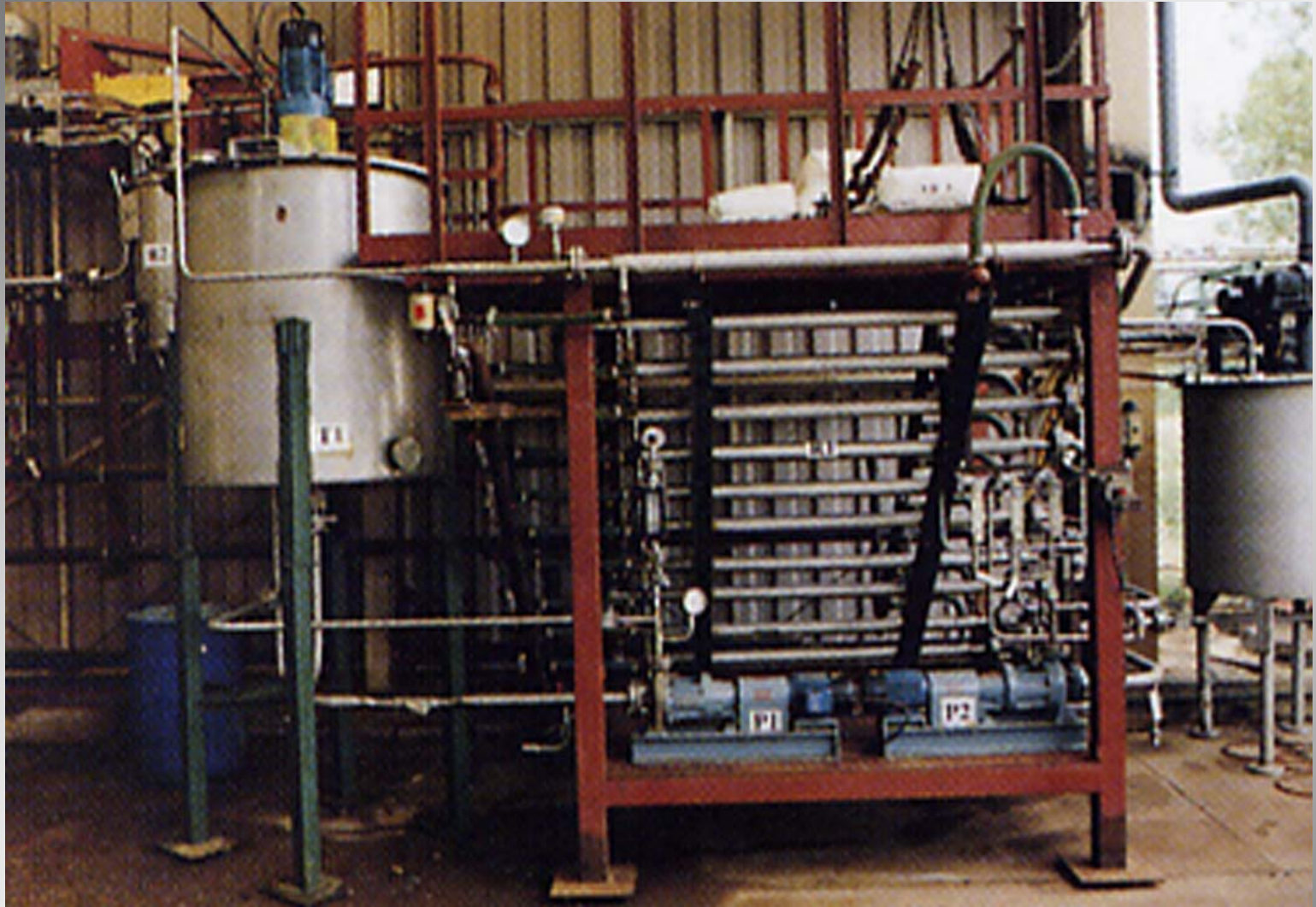
**Figure 6: The Insulated Exotherm Test**



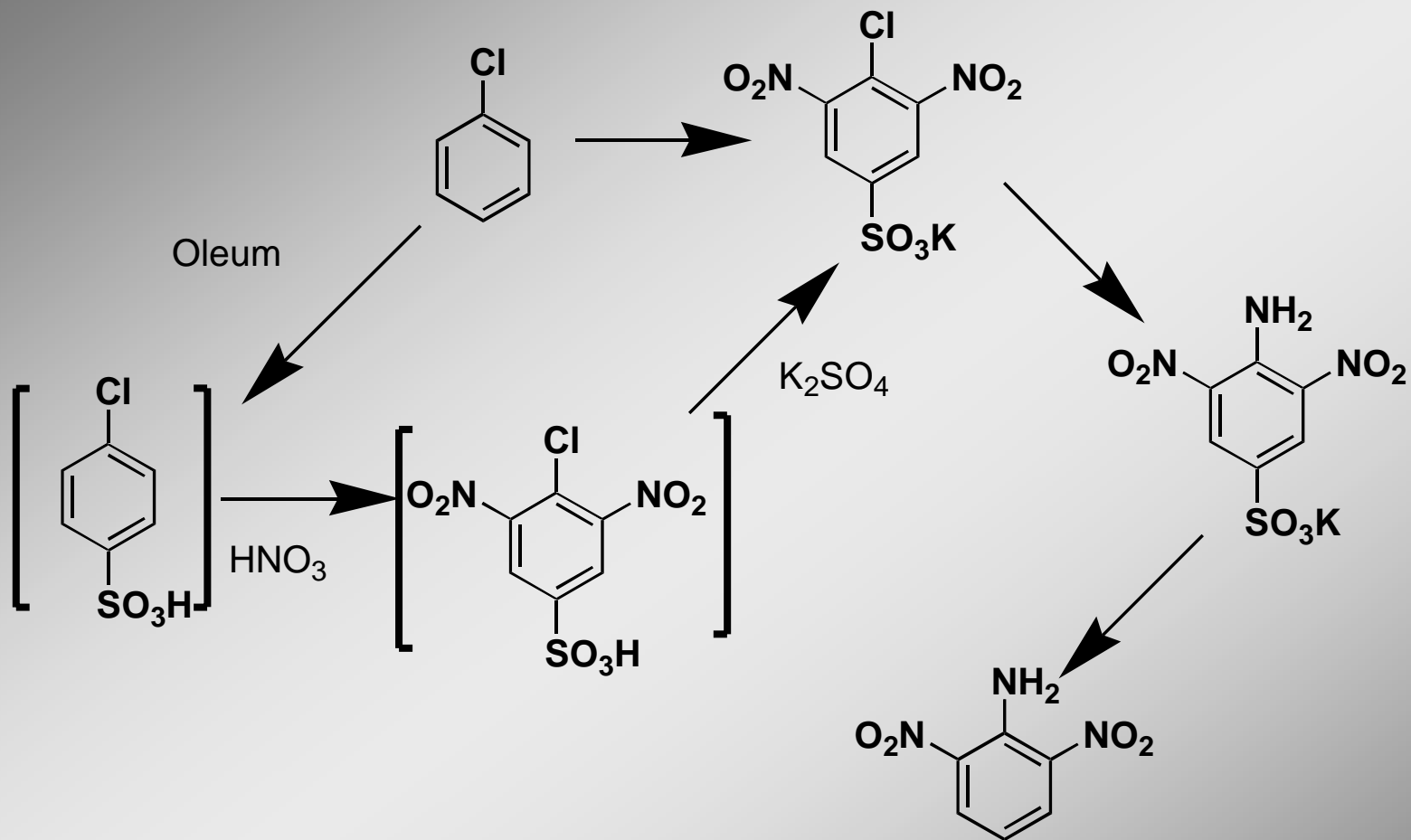
**Figure 7. Mono- and Di-nitration**

**Figure 8. Cascade Plug Flow Reactor**



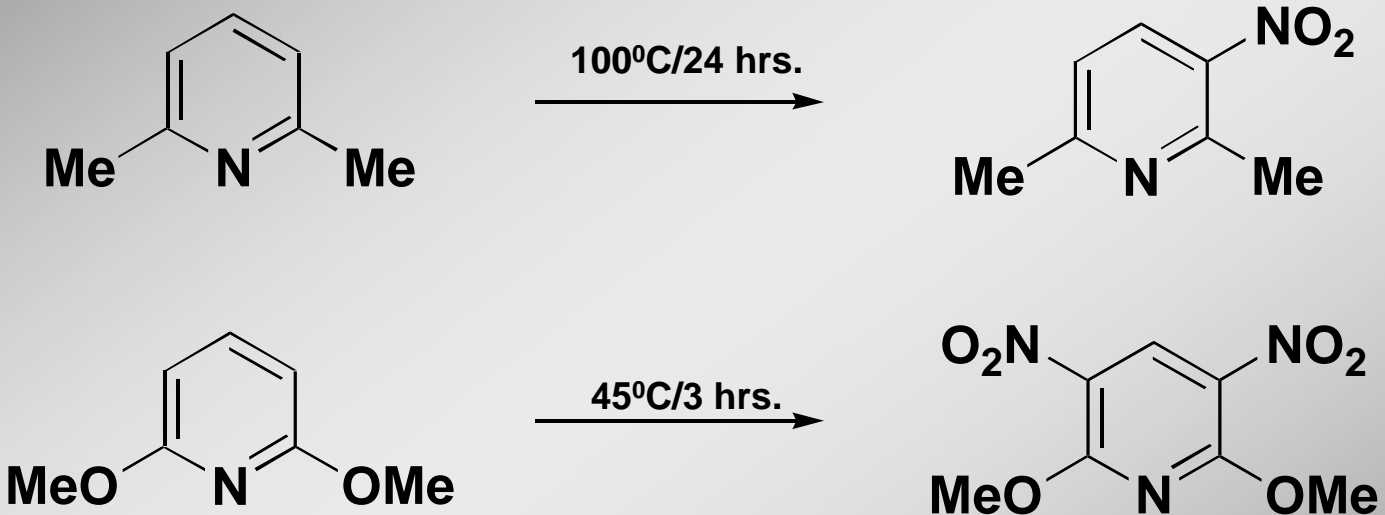


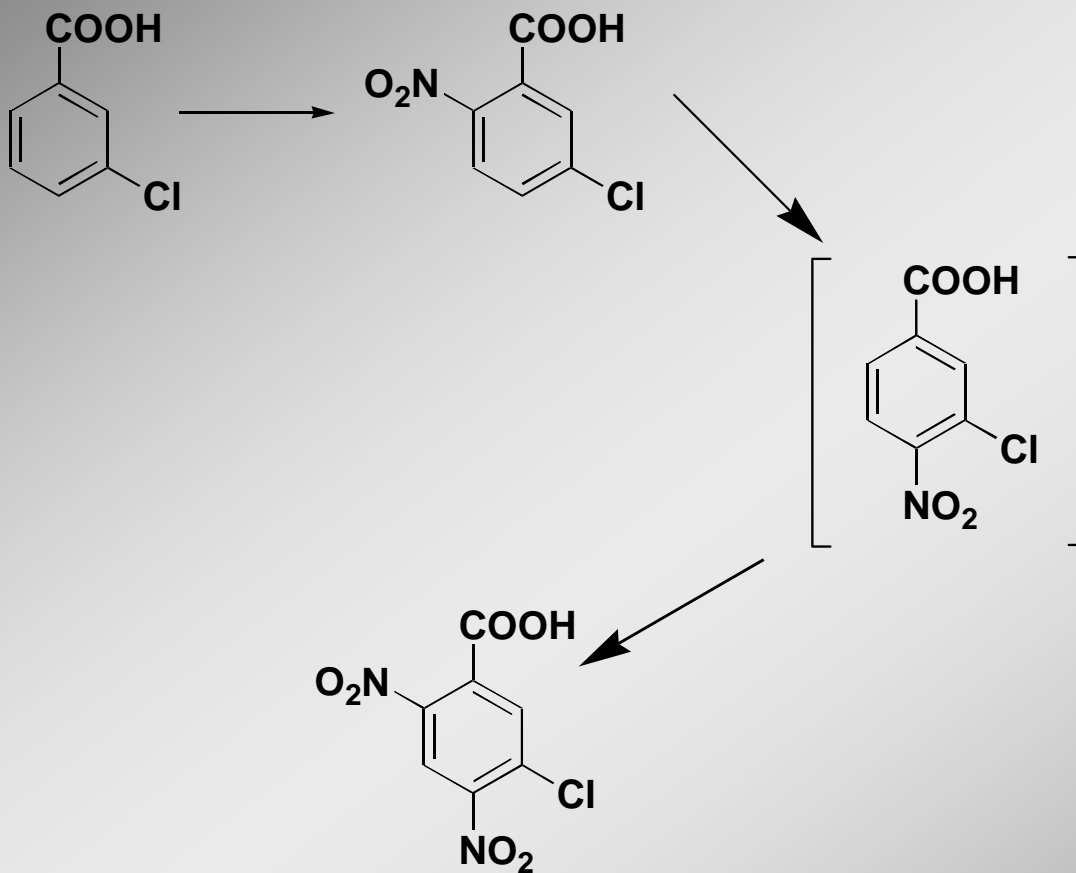
**Figure 9. Continuous Plug Flow Reactor**



**Figure 10. Control of Substitution Pattern**

## Figure 11. Activating/deactivating Substituents





**Figure 12. Indirect Nitration Techniques**

**Thanks to:**

**Dr Paul McCarthy**

**Dr Rob Rees**

**Dr Tom Sellers**

**and the rest of the great**

**fine chemicals team at exchem organics**