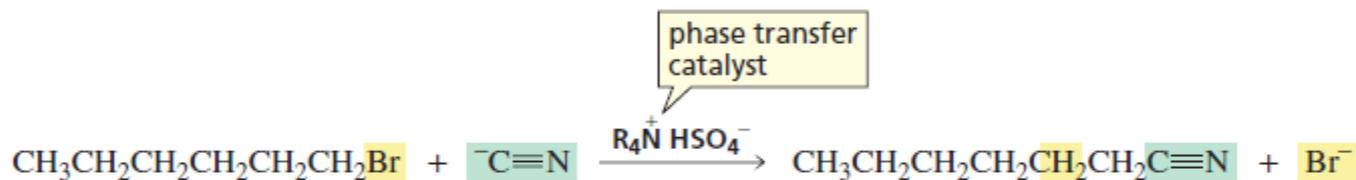


Phase-transfer catalyst or PTC is a catalyst that facilitates the migration of a reactant from one phase into another phase where reaction occurs. Phase-transfer catalysis is a special form of heterogeneous catalysis. Ionic reactants are often soluble in an aqueous phase but insoluble in an organic phase in the absence of the phase-transfer catalyst. The catalyst functions like a detergent for solubilizing the salts into the organic phase. Phase-transfer catalysis refers to the acceleration of the reaction upon the addition of the **phase-transfer catalyst**.

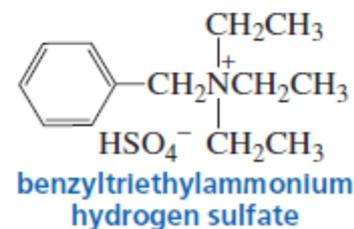
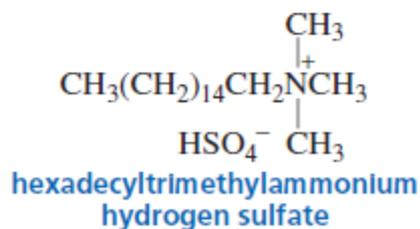
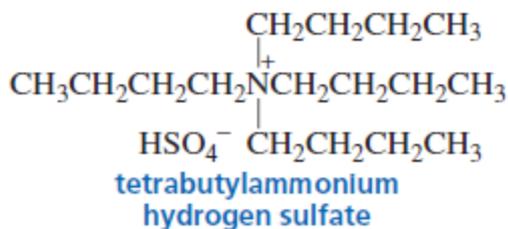


The two compounds will be able to react with each other if a catalytic amount of a phase transfer catalyst is added to the reaction mixture.

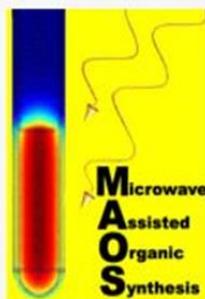


Quaternary ammonium salts are the most common phase transfer catalysts. However, we saw in Section 12.9 that crown ethers can also be used as phase transfer catalysts.

phase transfer catalysts



Microwave Assisted Organic Synthesis



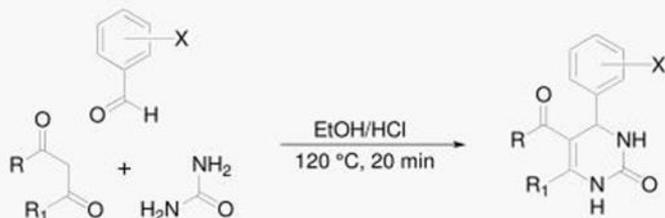
Benefits of MW-Assisted Synthesis

Definition

“Preparation of a desired organic compound from available starting materials via some (multi-step) procedure, involving microwave irradiation”

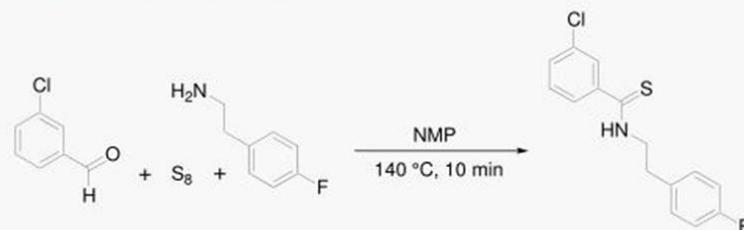
- ✓ higher temperatures (superheating / sealed vessels)
- ✓ faster reactions, less byproducts, pure compounds
- ✓ absolute control over reaction parameters
- ✓ selective heating / activation of catalysts
- ✓ energy efficient, rapid energy transfer
- ✓ easy access to high pressure performance
- ✓ can do things that can't be done conventionally

1) Biginelli Multicomponent Reaction



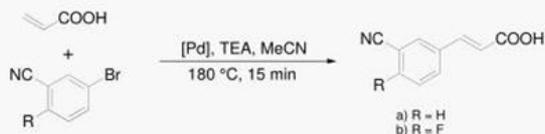
- ✓ effective multicomponent reaction
- ✓ optimized conditions tolerable to broad range of building blocks
- ✓ library generation in multi-gram scale (up to 80 mmol/vessel)
- ✓ 16 different targets within one run

2) Kindler Thioamide Synthesis

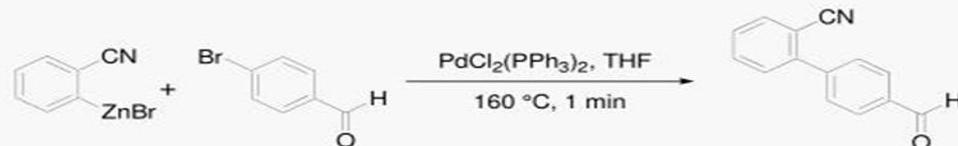


- ✓ efficient synthesis of valuable building blocks for biologically relevant heterocyclic scaffolds (40 mmol/vessel)
- ✓ significantly reduced reaction times
- ✓ unproblematic use of large amounts of elemental sulfur
- ✓ suitable reaction for library generation

4) Negishi Coupling

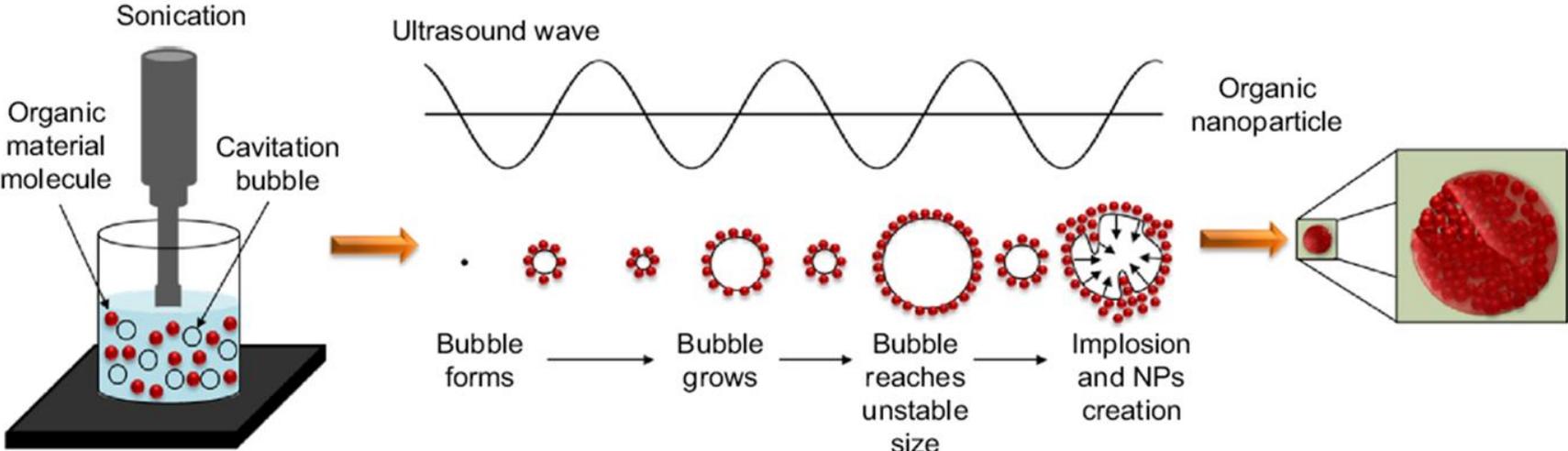


- ✓ most important C-C bond forming reaction
- ✓ no interference of metal layer with microwaves
- ✓ parallel synthesis (20 mmol/vessel) with broad range of substrates and varying catalysts
- ✓ unproblematic use of significant amounts of Pd catalyst (1 mol%)



- ✓ short reaction times even at larger scale (20 mmol/vessel)
- ✓ protection of sensitive reagents by inert gas flush
- ✓ use of dummy loads did not affect the reaction progress

Sonochemistry is the application of ultrasound to chemical reactions and processes. The mechanism causing sonochemical effects in liquids is the phenomenon of acoustic cavitation. Hielscher ultrasonic laboratory and industrial devices are used in a wide range of sonochemical processes.



Materials Applications of Ultrasound

