

# OCR Reaction Conditions

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A table of reaction conditions for organic chemistry (OCRA). Note that OCR rarely award marks for reaction conditions such as temperatures, pressures or solvents. They do, however, penalise incorrect use of reagent, for example using  $\text{NaBH}_4$  when only  $\text{LiAlH}_4$  will work.

Reactant	Product	Reagents	Conditions	Solvent
Alkane	Haloalkane	Cl <sub>2</sub>	UV light	NA
Alkene	Alkane	H <sub>2</sub> , Ni catalyst	150 °C, 200 kPa	NA
(Alkene)	Alcohol	1. conc H <sub>2</sub> SO <sub>4</sub> 2. H <sub>2</sub> O	1. Cold 2. Warm	NA
Alkene	Alcohol	steam, H <sub>3</sub> PO <sub>4</sub> catalyst	300 °C, 600 kPa	NA
Alkene	Haloalkane	HBr or HCl	RT	Organic
Alkene	Dihaloalkane	Br <sub>2</sub> (aq)	RT	?
Alkene	Polyalkene	Ziegler-Natta catalyst, high pressure	Various	NA
Haloalkane	Alkene	alcoholic KOH	Distil warm	Ethanol
Haloalkane	Amine	KCN then H <sub>2</sub> and Ni cat	RT	Ethanol
Haloalkane	Amine	excess NH <sub>3</sub>	heat under pressure	Ethanol
Haloalkane	Nitrile	KCN	Reflux	Ethanol
Haloalkane	Alcohol	aqueous OH <sup>-</sup>	Warm gently	NA
Alcohol	Haloalkane	NaBr/H <sub>2</sub> SO <sub>4</sub> 50/50	Reflux	?
Alcohol	Aldehyde	H <sup>+</sup> , K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	Distill	NA
Alcohol	Ketone	H <sup>+</sup> , K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	Distill or reflux if 2y OH	NA
Alcohol	Alkene	H <sub>2</sub> SO <sub>4</sub> /H <sub>3</sub> PO <sub>4</sub> , conc	Heat	NA
Alcohol	Carboxylic acid	H <sup>+</sup> , K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	Reflux	NA
Carboxylic acid	Acyl chloride	SOCl <sub>2</sub>	NA	NA
Acyl chloride	Carboxylic acid	H <sub>2</sub> O	Cold!	NA
Acyl chloride	Ester	Alcohol	RT	Organic
Acyl chloride	Amide	1y amine (2 equiv.)	RT	NA
Amine (1y/2y)	Amine (2y/3y)	Haloalkane (RCl)	Warm	Ethanol
Ammonia	4y ammonium salt	Haloalkane (RCl)	Warm	Ethanol
Nitrile	Carboxylic acid	dilute HCl	Reflux	NA
Aldehyde/ketone	Alcohol	1. NaBH <sub>4</sub> 2. H <sub>2</sub> O or dilute acid	RT	1. Organic
Aldehyde/ketone	Hydroxynitrile	NaCN and dilute HCl	?	Aqueous

Table 1: Aliphatic transformations

Reactant	Product	Reagents	Conditions	Solvent
Benzene	Cyclohexane	H <sub>2</sub> , Ni cat	High pressure and temp	NA
Benzene	Halo benzene	X <sub>2</sub> , acid cat (FeX <sub>3</sub> )	Reflux	NA
Benzene	Alkyl benzene	Haloalkane R-X, acid cat (FeX <sub>3</sub> )	Reflux	NA
Benzene	Acyl benzene	Acyl chloride, acid cat (FeCl <sub>3</sub> or AlCl <sub>3</sub> )	Reflux	NA
Benzene	(mono-)Nitrobenzene	H <sub>2</sub> SO <sub>4</sub> , conc and HNO <sub>3</sub> , conc	Below 55 °C	NA
Nitrobenzene	Phenylamine (Aniline)	1. Sn, conc. HCl 2. NaOH(aq)	Reflux	NA
Phenol or Phenylamine	Bromo compound	Br <sub>2</sub> (aq)	Cold	NA
Phenol or Phenylamine	Nitro compound	HNO <sub>3</sub> (aq/dilute)	Warm/Reflux?	NA

Table 2: Aromatic transformations