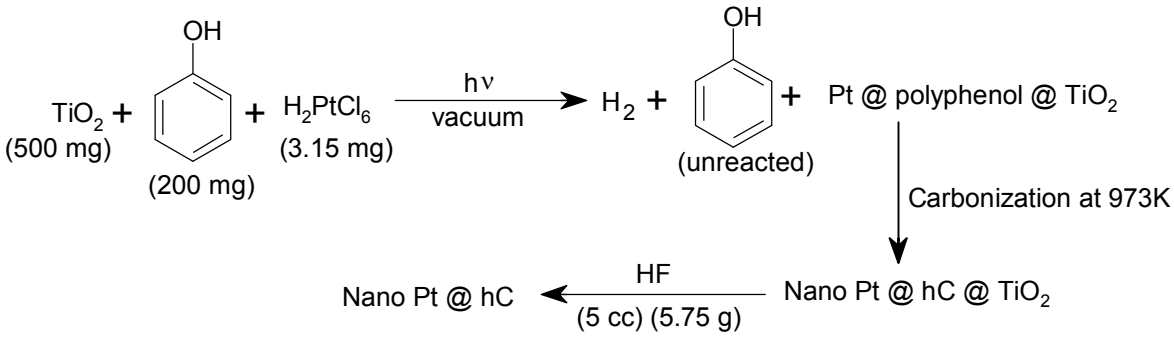
Supplementary Material

E-factor calculations for the synthesis of 1 and 2 and the reported three other catalysts: Pt@hc; ARP-Pt; Pt-GLY.

Calculation of E-factor values for various Pt nanocatalyst systems:

E-factor = Kg (waste)/Kg (product)

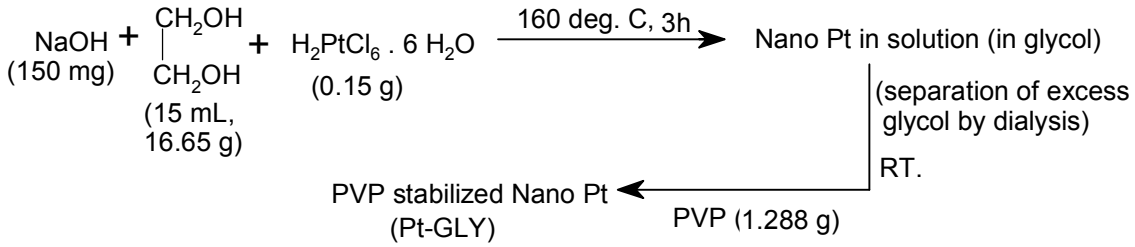
1. <u>Chem. Commun., 2008, 3181 (Pt@hc)</u>



Total amount of reactants: 500 mg + 200 mg + 3.15 mg + 5.75 g = 6.48 g
Amount of final product: 203 mg., assuming that the same amount of phenol and platinum salt used in the beginning are retained in the final catalyst.
Amount of waste: (6.48 – 0.203) g = 6.277 g

E-Factor = Amount of waste/Amount of product = 6.277/0.203 = 30.92

2. <u>Chem. Commun., 2007, 4375 (Pt-GLY)</u>

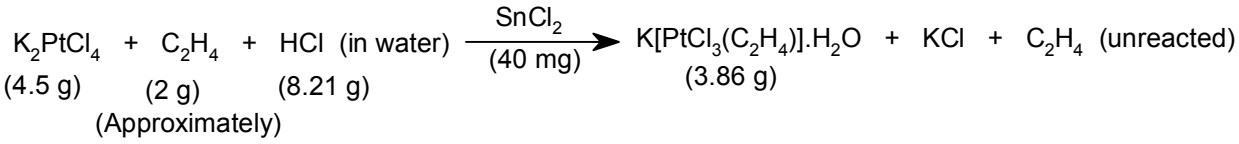


Total amount of reactants: 0.150 g + 16.65 g + 0.15 g + 1.288 g = 18.178 g
Amount of final product: 1.328 g, assuming that the same amount of PVP and platinum salt used in the beginning retain in the final catalyst.
Amount of waste: (18.178 – 1.328) g = 16.85 g

E-Factor = Amount of waste/Amount of product = 6.277/0.203 = 12.68

3. <u>Angew. Chem. Int. Ed., 2007, 46, 704 (ARP-Pt)</u>

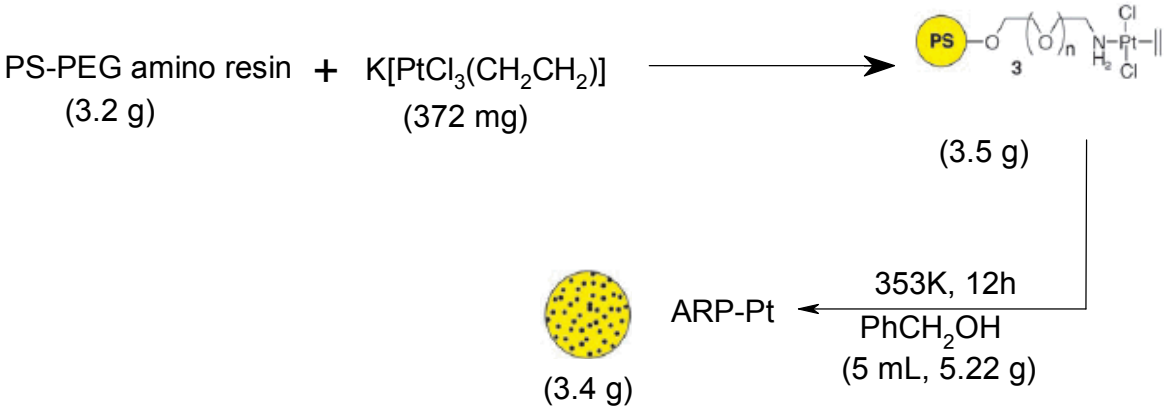
E-Factor for the synthesis of Zeises salt, $K[PtCl_3(C_2H_4)]\cdot H_2O$:



Total amount of reactants: 4.5 g + 2 g + 8.21 g = 14.71 g [solvent (water) and catalyst ($SnCl_2$) have been excluded from this calculation].
Amount of final product: 3.86 g
Amount of waste: (14.71 – 3.86) g = 10.85 g

E-Factor = Amount of waste/Amount of product = 10.85/3.86 = 2.81

E-Factor for the synthesis of final catalyst:



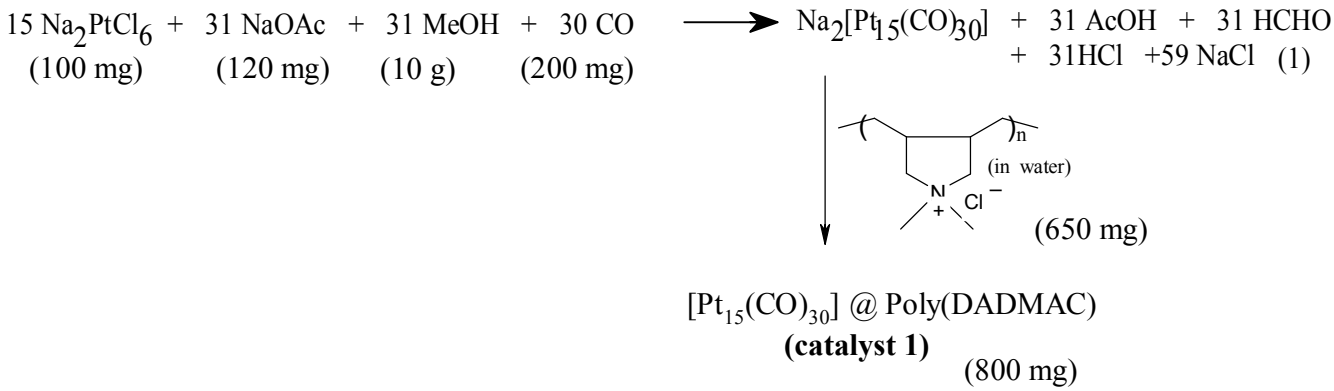
Total amount of reactants: 3.2 g + 0.372 g + 5.22 g = 8.792
Amount of final product: 3.4 g
Amount of waste: (8.792 – 3.4) g = 5.392 g

E-Factor = Amount of waste/Amount of product = 5.392/3.4 = 1.58

Total E factor = 2.81+1.58 = 4.39

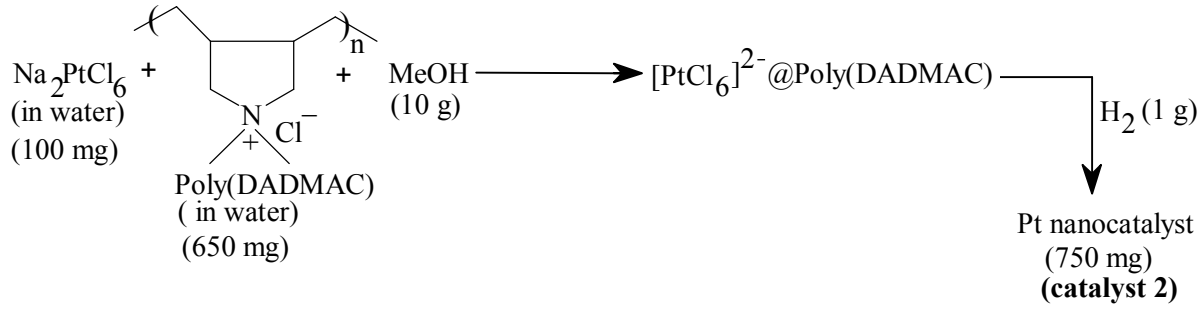
4. Our systems:

For catalyst 1



Total amount of reactants: 100 mg + 120 mg + 200 mg + 650 mg + 10 gm = 11070 mg.
Amount of final product: 800 mg
Amount of waste: (11070 – 800) mg. =10 270 mg.
E-Factor = Amount of waste/Amount of product = 10270/800 = 12.8

For catalyst 2



Total amount of reactants: 100 mg + 650 mg + 10 g + 1 g = 11750 mg.
Amount of final product: 750 mg
Amount of waste: (11750 – 750) mg. =11000 mg.
E-Factor = Amount of waste/Amount of product = 11000/750 = 14.66