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Institutt for kjemi

Contact person:

1.amanuensis Odd Reidar Gautun

Tlf.: 73 59 41 01

English

Exam in KJ8105 Organometallic compounds in organic synthesis

Tuesday 5. June 2012 kl. 0900 – 1300

Permitted tools: D - No printed or written text is permitted.

Molecular models are permitted.

			_			_			_			_			_			
	fluorine 9	щ	18.998	17	\overline{c}	35,453	bromine 35	В	79.904	odine 53	-	126.90	astatine 85	At	[210]			
9	oxygen 8	0	15,999	16	ഗ	32.065	selenium 34	Se	78.96	tellurium 52	Te	127.60	polonium 84	Po	[209]			
ŷ.	nitrogen 7	Z	14.007	15	Д	30.974	arsenic 33	As	74.922	antimony 51	Sb	121.76	bismuth 83	Ö	208.98			
E	carbon 6	ပ	12.011	4	S	28.086	germanium 32	Ge	72.61	2 0 ≣	Sn	118.71	lead 82	Pb	207.2	ununquadlum 114	Ond	[289]
	boron 5	m	10.811	13	4	26.982	gallium 31	Ga	69.723	mdium 49	_	114.82	thallium 81	F	204.38			
							30 30	Zn	65.39	cadmium 48	S	112.41	mercury 80	Ha	200.59	unumbium 112	Uub	[277]
							copper 29	CC	63.546	silver 47	Ag	107.87	plog 79	Au	196.97	111	Uuu	[272]
i .							nicke 28	Z	58.693	palladium 46	Pd	106.42	platinum 78	Pt	195.08	unumillum 110	Uun	[271]
									12.0		Rh					=		
ч							<u>170</u>	Fe	55.845	ruthenium 44	Ru	101.07	osmium 76	Os	190.23	hassium 108	H	[569]
0							manganese 25	Z	54.938	technetium 43	1 C	[86]	rhenium 75	Re	186.21	potrium 107	Bh	[564]
0							chromium 24	ပ်	51.996	molybdenum 42	Θ	95.94	tungsten 74	>	183.84	seaborgium 106	Sg	[592]
6							vanadium 23	>	50.942	niobium 41	O Z	92.906	tantalum 73	Ta	180.95	105	Db	[262]
							titanium 22	F	47.867	zirconium 40	Zr	91.224	hafnium 72	Ħ	178.49	rutherfordium 104	Ŗ	[261]
9							scandium 21	Sc	44.956	yttrium 39	>	88.906	lutetium 71	Γn	174.97	lawrencium 103	۲	[262]
													57-70	*		89-102	*	
	beryllium 4	Be	9.0122	12	Mg	24.305	calcium 20	Ca	40.078	strontium 38	Sr	87.62	barium 56	Ba	137.33	88	Ra	[226]
hydrogen 1	ithium 3	=	6.941 Sodium	11	Na	22.990	potas sium	¥	39.098	rubidium 37	Rb	85.468	caesium 55	Cs	132.91	francium 87	F	[223]
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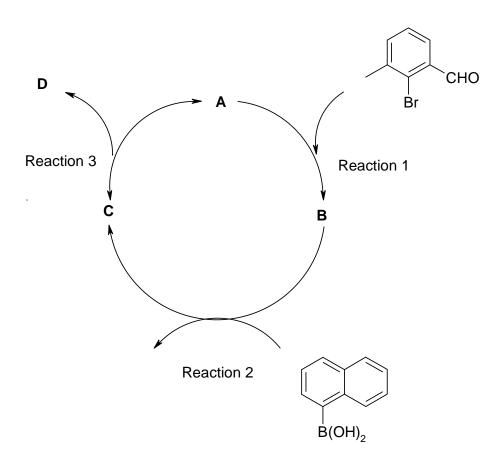
Problem I (25 points)

For each of the following compounds:

- (a) What is the number of electrons in the valence shell of the metal?
- (b) What is the oxidation state of the metal?

Problem II (25 points)

- (a) Name the elementary reaction shown for each of the steps in the catalytic cycle below.
- (b) What are the structures A C?
- (c) What is the oxidation state for catalyst in the different complexes?
- (d) What is the name of the reaction?



Problem III (25 points)

Give the reagents necessary for promoting the transformations shown below. Some of the reactions may involve several steps.

Problem IV (25 points)

(a) Dicyclopentadiene (DCPD) is an attractive monomer for polymer production, as it is inexpensive, and the resulting polymer products are useful for a variety of applications. Give reagents and mechanism for the reaction shown below.

Angew. Chem. Int. Ed. 2006, 45, 3760

(b) Show the mechanism involved for the reaction shown below. Is the reaction catalytic regarding palladium?

$$\frac{\text{PhO}_2\text{S}}{\text{PhO}_2\text{S}} = \frac{\text{Pd}_2(\text{dba})_3\text{CHCl}_3, \text{ CH}_3\text{CN}}{\text{AcOH, LiOAc, }80\%} = \frac{\text{PhO}_2\text{S}}{\text{PhO}_2\text{S}} = \frac{\text{OAc}}{\text{CH}_3\text{CN}} = \frac{\text{PhO}_2\text{S}}{\text{PhO}_2\text{S}} = \frac{\text{PhO}_2\text{S}}{\text{PhO}_2\text{S}}$$

dba = dibenzalacetone (= dibenzylideneacetone)

JACS 1988, 110, 8239

Good Luck!

ORG