General remarks

A strange ambiguity seems to prevail when one discusses the event horizon of a black hole. On the one hand, it is a monster gobbling up things which will never return. On the other, it is a harmless region, as curvature and other physical variables are finite there for the freely falling observer. Is the event horizon eventful or a neutral spectator? The contradiction arises due to the need for reconciling two opposite points of view: that of the freely falling observer and the asymptotic observer. The suggestion that they are complementary and we cannot listen to both, thus, seems an attractive idea. When all the dust has settled down, what has been chalked up on the board? We are no wiser as even the two-dimensional models have turned out to be not solvable in closed form. Some new ideas and a lot of new techniques have come up in the process. The black-hole complementarity seems a very attractive idea. However, the theorists working in this area (both particle physicists and general relativists) have to get a lot more confidence in their mathematical techniques before a consensus emerges. Can an observable prediction emerge? One can always hope. Maybe in the area of cosmology, where too we have an event horizon, a prediction may emerge!

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New routes for the synthesis of organo-metallic reagents

Mariappan Periasamy

In recent years, organometallic reagents have been utilized in numerous functional group transformations and C–C bond-forming reactions in organic synthesis. However, several of these synthetic methods require reagents which are not readily accessible to practising organic chemists. We have undertaken research efforts to synthesize some of these useful reagents in situ from readily available starting materials for applications in organic synthesis. For example, hydroboration of olefins can be readily achieved by the $CH_3COOH/NaBH_4$ or $(CH_3COO)_2Hg/NaBH_4$ combinations[1–3]. These reagent combinations work as good as or better than the exotic reagent systems previously employed in certain selective hydroborations[3, 4].

It has been known for some time that the reaction of I_2 with $NaBH_4$ in diglyme gives B_2H_6 gas which is also relatively pure compared to the reagent generated using $F_3B : OEt_2$ in place of I_2 (ref. 5). It appears that this method has not been widely utilized for the generation of B_2H_6 because these authors utilized *vacuum* line techniques for the isolation of the reagent in a series of liquid N_2 traps[5, 6]. We have found that B_2H_6 can be readily generated from the I_2–$NaBH_4$ combination using the apparatus recommended for the $BF_3/NaBH_4$ reagent system[6, 7]. Several amine–BH_3 complexes, including chiral

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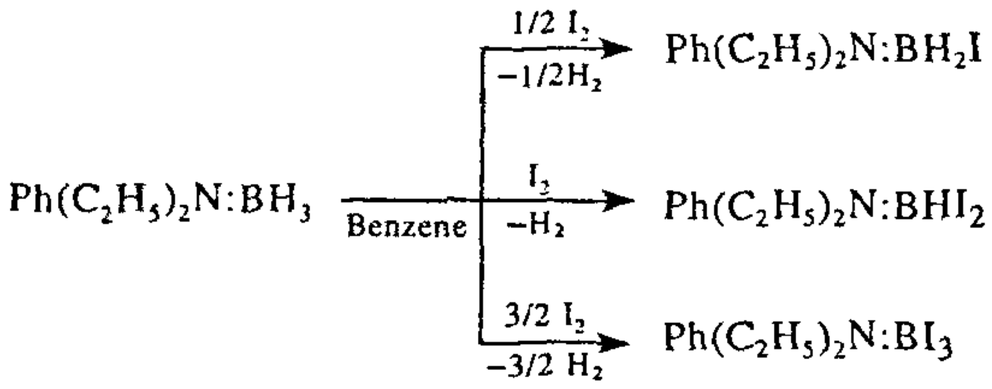
amine boranes, have been prepared following this method for synthetic applications[7-9].

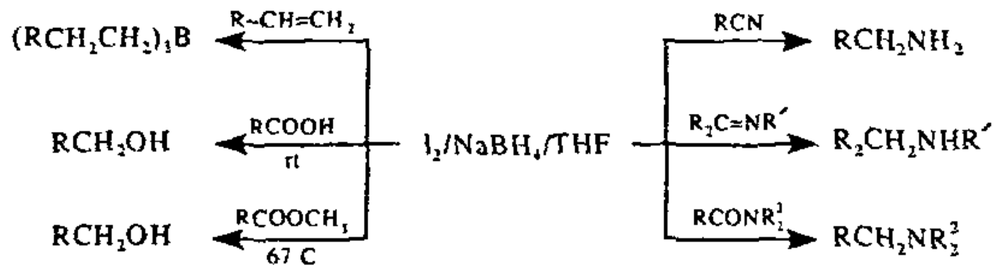
$$I_2 + 2NaBH_4 \xrightarrow[-H_2,\ -2NaI]{\text{Diglyme}} B_2H_6 \xrightarrow[\text{Benzene}]{R_3N} R_3N{:}BH_3$$

Catecholborane and its derivatives have been readily prepared for synthetic applications using the B_2H_6 generated in this way[10-12].

Several iodoborane complexes have been prepared for applications in hydroborations, reductions, iodinations and also in cleavage of carbamates, esters and ethers[13-16].



Recently, we have reported that the readily accessible $I_2/NaBH_4$ reagent system is useful for several synthetic applications[17,18].



McKennon *et al.*[19] reported that the $I_2/NaBH_4$ reagent system is excellent for the reduction of amino acids to amino alcohols.

$$\underset{\displaystyle NH_2}{\overset{\displaystyle |}{R{-}CH{-}COOH}} \xrightarrow[THF]{I_2/NaBH_4} \underset{\displaystyle NH_2}{\overset{\displaystyle |}{R{-}CH{-}CH_2OH}}$$

The reactive species of the $I_2/NaBH_4$ combination in the THF solvent would be BH_3 : THF (ref. 18). Hence, it is expected that this reagent system will become the method of choice for applications in which the BH_3 complexes are required.

We have also developed several useful transition metal reagents *in situ* for synthetic applications using readily accessible starting materials (Figure 1)[20-25].

Also, methods have been developed for the preparation of several useful metal carbonyl complexes for synthetic utilizations (Figure 2)[26-32].

It is anticipated that several of these methods would become the methods of choice for the synthesis of these materials. Very recently, we have reported convenient

$$CoCl_2 \xrightarrow[THF]{NaBH_4/Ph_3P} (Ph_3P)_2Co(H)Cl$$

$$CuCl \xrightarrow[THF]{NaBH_4/Et_3N/MgBr_2} CuH \cdot MgBr_2$$

$$CuCl \xrightarrow[THF]{NaBH_4/MgBr_2} CuH \cdot MgBr_2$$

$$Cp_2TiCl_2 \xrightarrow[THF]{BrCH_2CH_2Br/Mg} Cp_2Ti$$

$$TiCl_4 \xrightarrow[THF]{BrCH_2CH_2Br/Mg} MCH_2CH_2M \quad (M = Mg,\ TiCl_3)$$

Figure 1.

$$CoCl_2 \xrightarrow[THF/CO]{NaBH_4} [\ ] \xrightarrow{\text{aq. NaOH}} [Co(CO)_4]^-$$

$$CoX_2 \xrightarrow{NaH/MgBr_2/CO/RC\equiv CR} (RC\equiv CR)Co_2(CO)_6$$

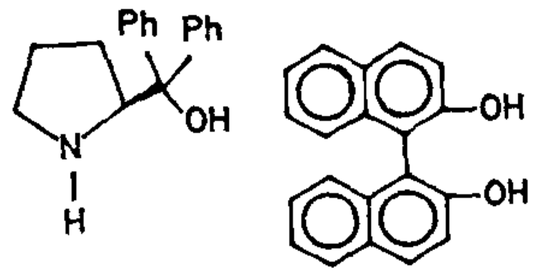
$$CoBr_2 \xrightarrow{Zn/RC\equiv CR/CO} (RC\equiv CR)Co_2(CO)_6$$

$$CoCl_2 \xrightarrow[THF/CO]{Na/Naphthalene} [Co(CO)_4]^-$$

$$\underset{\text{or } Fe(CO)_5}{FeCl_3} \xrightarrow[THF/CO]{Na/Naphthalene} [Fe(CO)_4]^{2-}$$

Figure 2.

methods for the synthesis of the following useful chiral amino alcohol and diol[33-35].



It is hoped that the simple, convenient methods of preparation of these useful materials will be helpful in further research developments in these areas. We are actively pursuing research activities on these topics.

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Bamboos – Some newer perspectives

C. K. John, Rajani S. Nadgauda and A. F. Mascarenhas

Bamboos are a part of the life and culture of southeast Asian people. They are a sought-after industrial raw material of considerable economic importance. All possible methods for their optimum utilization need to be tried. Bamboos have a peculiar behaviour of flowering and seeding at the end of very long vegetative growth phases, the length of which is considered to be species-specific. This makes their perennial propagation by seeds and their improvement by hybridizations practically impossible. Some inherent properties of bamboos can be exploited profitably to overcome these difficulties. In vitro induction of flowering has vast potential in bamboos. Bamboos need to be viewed in a broader perspective.

BAMBOOS are a most useful group of plants, and are members of the grass family (*Poaceae*)[1]. Two important characters which make (majority of) them distinct from other grasses are: (i) woody perennial habit and (ii) peculiar flowering and seeding behaviour[2]. Most woody bamboos flower and seed at the end of very long periods of vegetative growth[3] (Figure 1). In India, bamboos are the major source of raw material for pulp and paper industries[4]. Besides, they are also used for a variety of

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