with control animals receiving only reserpine and the vehicle. Isocarboxazid, a therapeutically known MAO inhibitor, was administered for comparison of activity. Similarly, reversal of reserpine-induced hypothermia was conducted. The temperature of the animals was observed at 0, 4, 6, and 24 hr after the administration of reserpine.

Sleeping Time Potentiation.—Most of the MAO inhibitor drugs prolong sleeping time induced by hexobarbital. Groups of six animals were chosen for testing of each compound. Each animal was given 0.275 mmole/kg of each compound except isocarboxazid which was given 0.137 mmole/kg. Two hours after the administration of the compound, hexobarbital was administered (55 mg/kg ip) and sleeping time was recorded as the time from administration of hexobarbital until the mice regained the ability to return to a righted position three times within 20 sec.

Results and Discussion

The results of three pharmacological tests for biological evaluation of compounds listed in Table I indicate that MAO-inhibitory activity of these hydrazides is significantly greater than was reported in the earlier paper.[2] The increase in activity probably could be ascribed to the less symmetric nature of these molecules which render them more soluble. It is also possible that two different sites of action may exist for two different types of hydrazine moieties, thus giving rise to potentiation of biological activity.

A direct relationship of MAO-inhibitory activity of a hydrazide, as tested by reversal of reserpine-induced ptosis or hypothermia, to hexobarbital sleeping time prolongation has been postulated in the past. Such correlation, however, could not be substantiated by the results of our experiments; in the ptosis and hypothermia tests isocarboxazid was revealed to be more active than the compounds listed in Table I, but it did not cause a significant prolongation of hexobarbital-induced sleeping time.

As shown in Table I, the hydrazides with methyl or benzyl substituents manifest greater prolongation of hexobarbital-induced sleeping time than their unsubstituted analogs. Such higher activity, however, is not observed when mean ptotic scores or hypothermia test results were compared. At the present, no concrete reason can be given for such results.

Apparently more analogs in the series are needed to arrive at a proper conclusion regarding the relationship of these compounds to their MAO-inhibitory activity and antidepressant property.

Compounds with Potential Enzyme Inhibitory Activity. Hydroxylamine Analogs of 2-Propynylamine[1a]

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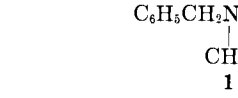
As a part of a study of structure–activity relationships of compounds possessing monoamine oxidase inhibitory and/or 5-hydroxytryptophan decarboxylase inhibitory activity, a series of O- or N-2-propynylhydroxylamines structurally related to pargyline has been prepared. Substituents on the hydroxylamine systems were chosen from those which have been shown to be significant in the amine series. Biological test data indicate that certain of the compounds are active enzyme inhibitors.

Interest in organic hydroxylamines and in acetylenic amines has increased in recent years as a result of numerous reports of potent biological activity ascribable to these functional groups. Specifically, compounds of these types have been found to be inhibitors of dopamine β-oxidase,[2] 5-hydroxytryptophan decarboxylase (5-HTP decarboxylase),[3] and of monoamine oxidases (MAO).[4-9] Swett, *et al.*,[6] described structure–activity relationships in the pargyline (N-benzyl-N-methyl-2-propynylamine, **1**) series, indicating the necessity of the N-2-propynyl group for MAO inhibitory activity. Reports[7] of MAO inhibition by N-alkyl-N-methyl-2-propynylamines suggest that the aromatic ring of pargyline may not be essential for activity.



1

In the present work, efforts were directed toward synthesis of the three isomeric tertiary hydroxylamines (**4**, **5**, **8**) which contain the benzyl, methyl, and 2-propynyl groups as in pargyline; the isomeric secondary hydroxylamines (**3**, **7**) which bear the benzyl and 2-propynyl groups; **9** and **10** which contain methyl and 2-propynyl groups; **2** and **6** which contain benzyl and

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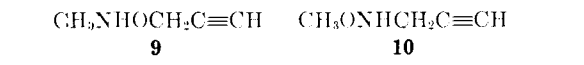
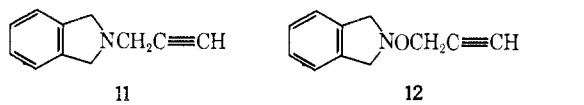
methyl groups; and the two isoindolines (**11**, **12**) which represent, respectively, cyclic analogs of pargyline and of the hydroxylamine **5**.

2, R = H; R′ = CH_3 **6**, R = H; R′ = CH_3
3, R = H; R′ = $CH_2C{\equiv}CH$ **7**, R = H; R′ = $CH_2C{\equiv}CH$
4, R = $CH_2C{\equiv}CH$; R′ = CH_3 **8**, R = CH_3; R′ = $CH_2C{\equiv}CH$
5, R = CH_3; R′ = $CH_2C{\equiv}CH$



9 **10**



11 **12**

An attempt to prepare **3** by $LiAlH_4$ reduction of O-2-propynylbenzaldoxime (**19**) failed; only benzylamine and 2-propyn-1-ol could be isolated. These results parallel those of Exner[10] whose treatment of benzaldoxime ethers with $LiAlH_4$ formed benzylamine and an alcohol. An attempt to prepare **3** by reduction of N-benzoyl-O-2-propynylhydroxylamine (**18**) with $LiAlH_4$ resulted in the isolation of a 70% yield of benzamide as the only identifiable product. Neither **3** nor benzylamine nor 2-propyn-1-ol could be isolated. It is difficult to explain these results on a mechanistic basis; there seems to be no literature precedent for formation of benzamide in this type of reaction.

All attempts to prepare **5** failed; attempts to prepare N-2-propynyloxyisoindoline (**12**) by $LiAlH_4$ reduction of N-2-propynyloxyphthalimide were not successful. Synthesis of these two compounds has not been achieved.

Discussion.—Some crossover inhibitions on MAO and 5-HTP decarboxylase were observed (Table I). Among all the compounds tested, the best inhibitor of 5-HTP decarboxylase, **7**, showed low inhibitory activity on MAO, whereas **8**, a good MAO inhibitor, did not strongly inhibit 5-HTP decarboxylase. These data would suggest that for MAO a methyl group capable of binding hydrophobically to the enzyme would increase the inhibitory activity, but that this group would not be essential for maximum inhibition of 5-HTP decarboxylase.

Experimental Section

Pharmacology. Monoamine Oxidase Inhibition Assay.—Mitochondrial monoamine oxidase from beef liver was isolated and purified as described in the literature.[11] Incubation was carried out at 37° for 30 min in a solution containing 0.15 mmole of the substrate (tyramine-1-^{14}C), varying amounts of inhibitor, 20 μl of enzyme, phosphate buffer pH 7.4, and H_2O to make a final volume of 1 ml. The product, a mixture of *p*-hydroxyphenylacetaldehyde and *p*-hydroxyphenylacetic acid, was extracted (EtOAc) in strongly acidic medium. After removal of the solvent, the product was assayed for ^{14}C in a liquid scintillation spectrometer and the concentration of the inhibitor at which enzyme activity was 50% inhibited (I_{50}) was determined (see Table I).

5-Hydroxytryptophan Decarboxylase Inhibition Assay.—Beef liver was homogenized in 5 vol of cold 0.05 *M* phosphate buffer pH 7.4. Incubation was carried out initially at 37° for 3 min in a solution containing 25 μl of the liver homogenate, 660 mμmoles of iproniazide phosphate, 40 mμmoles of pyridoxal phosphate, phosphate buffer pH 7.4, and H_2O to make a final volume of 0.9 ml. DL-5-Hydroxytryptophan-3-^{14}C (100 μl, 24 mμmoles) was then added with varying amounts of the inhibitor, and the incubation was continued for 30 min. The product, 5-hydroxytryptamine-2-^{14}C (serotonin) was extracted according to the procedure of Snyder and Axelrod,[12] and assayed for ^{14}C in a liquid scintillation spectrometer. The concentration of the inhibitor at which enzyme activity was 50% inhibited (I_{50}) was determined (see Table I).

Chemistry.[13] **O-2-Propynylbenzaldoxime** (**19**).—Benzaldoxime (18.2 g, 0.15 mole) in 20 ml of anhydrous EtOH was added to a stirred solution of 3.4 g (0.15 g-atom) of Na in 100 ml of anhydrous EtOH, followed by dropwise addition of 17.9 g (0.15 mole) of 3-bromopropyne (Aldrich Chemical Co.) in 30 ml of anhydrous EtOH; the resulting mixture was heated under reflux for 5 hr. After cooling, the EtOH was removed at 30° under reduced pressure, and the residual brown semisolid was taken up in 200 ml of H_2O. This solution was extracted with five 50-ml portions of Et_2O; the combined extracts were dried ($MgSO_4$) and filtered, and Et_2O was removed from the filtrate under reduced pressure. The resulting brown liquid was distilled at 58° (0.1 mm) to yield 19 g (80%) of a light yellow liquid, n^{25}D 1.5563. *Anal.* ($C_{10}H_9NO$) C, H, N.

Sodium benzohydroxamate (**20**) was prepared by treating 92 g (0.675 mole) of benzohydroxamic acid (Aldrich Chemical Co.) with 37 g (0.675 mole) of NaOMe in anhydrous MeOH. The resulting cloudy solution was taken to dryness under reduced pressure at 30°; the residual white solid was washed with anhydrous Et_2O and air dried to yield 102 g (95%) of material which was used without further purification.

N-Benzoyl-O-methylhydroxylamine (**21**)[14] had mp 59–60°, bp 113–114° (0.2 mm), lit.[14] mp 62°.

N-Benzoyl-O-2-propynylhydroxylamine (**18**).—A modification of a method of Cooley, *et al.*,[15] was employed. A stirred mixture of 48 g (0.3 mole) of **20** and 36 g (0.3 mole) of 3-bromopropyne in 300 ml of MeCOEt was heated under reflux for 5 hr. After cooling, the reaction mixture was taken to dryness under reduced pressure at 30°, leaving a yellow solid which was taken up in 100 ml of H_2O. This solution was extracted three times with Et_2O; the combined extracts were dried ($MgSO_4$) and filtered, and Et_2O was removed from the filtrate under reduced pressure. The resulting yellow solid was recrystallized (CCl_4) to yield 49 g (93%) of a white crystalline solid, mp 91–92°. *Anal.* ($C_{10}H_9NO_2$) C, H, N.

N-Benzoyl-O-benzylhydroxylamine (**22**) was prepared as described for **18**, using 10 g (0.063 mole) of **20** and 10.8 g (0.063 mole) of benzyl bromide in 100 ml of DMF; yield 12.8 g (90%) of a white crystalline solid, mp 102–104° (from 50% EtOH), lit.[15] mp 103–105°.

N,O-Dibenzoyl-N-methylhydroxylamine (**23**)[16] had mp 55–56°, lit.[16] mp 56°.

Sodium N-methylbenzohydroxamate (**24**).—To a freshly prepared solution of 11.5 g (0.5 g-atom) of Na in 500 ml of anhydrous EtOH was added 127.5 g (0.5 mole) of **23**, and the mixture was stirred under reflux for 2 hr. After cooling, the reaction mixture was taken to dryness under reduced pressure at 30°; the residual tan semisolid was washed several times with $CHCl_3$, collected on a filter, and air dried to yield 83.5 g (96%) of a white solid. A solution of 1.75 g of this material in 25 ml of H_2O was saturated with solid CO_2 and extracted with three 25-ml portions of Et_2O; the combined extracts were dried ($MgSO_4$) and filtered, and the Et_2O was removed from the filtrate under reduced pressure. The resulting white solid was recrystallized from C_6H_6 to yield 1.4 g (92%) of material, mp 40–41°, lit.[14] mp 42° for N-methylbenzohydroxamic acid.

N-Benzoyl-N-methyl-O-2-propynylhydroxylamine (**17**) was prepared by the method described for **18**, using 35 g (0.2 mole) of **24** and 24 g (0.2 mole) of 3-bromopropyne in 400 ml of MeCOEt; yield 35 g (92%) of a light yellow liquid, bp 85–86° (0.05 mm), n^{25}D 1.5371. *Anal.* ($C_{11}H_{11}NO_2$) C, H, N.

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TABLE I

ENZYME INHIBITION BY HYDROXYLAMINE DERIVATIVES

$$R'NOR''$$
$$|$$
$$R—$$

No.	R	R′	R″	MAO inhib %	MAO inhib Inhib concn, m*M*	5-HTP decarboxylase inhib %	5-HTP decarboxylase inhib Inhib concn, m*M*
1	Pargyline			50	0.040	50	4.4
8	CH_3	$CH_2C{\equiv}CH$	$CH_2C_6H_5$	50[a]	0.19	0[a]	3.0[b]
7	H	$CH_2C{\equiv}CH$	$CH_2C_6H_5$	50	6.6	50	1.2
6	CH_3	H	$CH_2C_6H_5$	50	1.6	50	11.6
4	$CH_2C_6H_5$	$CH_2C{\equiv}CH$	CH_3	50[c]	1.5[d]	0	1.0[b]
29	C_6H_5CO	$CH_2C{\equiv}CH$	CH_3	25[a]	7.0[e]	17[a]	2.5[e]
16	C_6H_5CO	$CH_2C{\equiv}CH$	$CH_2C_6H_5$	0[f]	0.20[g]	0[f]	0.2[b]
10	H	$CH_2C{\equiv}CH$	CH_3	50	0.15	50	10.5
3	$CH_2C_6H_5$	H	$CH_2C{\equiv}CH$	50	0.47	50	4.5
17	C_6H_5CO	CH_3	$CH_2C{\equiv}CH$	50[a]	5.4	13[a]	2.5[e]
15	C_6H_5CO	$CH_2C_6H_5$	$CH_2C{\equiv}CH$	0[f]	0.10[g]	0[f]	0.2
2	$CH_2C_6H_5$	H	CH_3	50	0.75	50	11.6
9	CH_3	H	$CH_2C{\equiv}CH$	50	1.1	19	5.0[e]
11	N-2-Propynyl-isoindoline			50	0.048	50	2.0

[a] Dissolved in propylene glycol. [b] Maximum solubility. No inhibition at this highest tested concentration. [c] Dissolved in 50% aqueous propylene glycol or 50% aqueous DMSO. Same result obtained for both solvents. [d] Extrapolated. Due to insolubility of the compound, the highest tested concentration was 9×10^{-4} *M*. [e] Highest tested concentration without precipitation. [f] Dissolved in DMSO. [g] No inhibition at this highest tested concentration.

N-Benzoyl-N-methyl-O-benzylhydroxylamine (**13**) was prepared as described for **18**, using 52 g (0.3 mole) of **24** and 51.3 g (0.3 mole) of benzyl bromide in 300 ml of anhydrous *i*-PrOH; yield 65.2 g (90%) of a colorless liquid, bp 128° (0.025 mm), $n^{25}D$ 1.5686. *Anal.* ($C_{15}H_{15}NO_2$) C, H, N.

N-Benzylhydroxylamine (**25**)[17] had mp 56–57°, lit.[17] mp 56–58°.

N,O-Dibenzoyl-N-benzylhydroxylamine (**26**)[18] had mp 128–129°, lit.[18] mp 131°.

Sodium N-benzylbenzohydroxamate (**27**) was prepared as described for **24**, using a solution of 2.3 g (0.1 g-atom) of Na in 175 ml of anhydrous EtOH and 33.1 g (0.1 mole) of **26**, yield 22.6 g (91%) of a white solid. A solution of 2.5 g of this material in 10 ml of H_2O was acidified with 10% HCl, followed by extraction with three 25-ml portions of Et_2O; the combined extracts were dried ($MgSO_4$) and filtered, and the filtrate was evaporated under reduced pressure. The residual white solid was recrystallized from H_2O to give 2.1 g (92%) of a white crystalline solid, mp 107–108°, lit.[19] mp 108° for N-benzylbenzohydroxamic acid.

N-Benzoyl-N-benzyl-O-methylhydroxylamine (**14**) was prepared as described for **18**, using 37.4 g (0.15 mole) of **27** and 28 g (0.15 mole) of methyl tosylate in 500 ml of anhydrous Me_2CO; yield 35 g (98%) of a colorless liquid, bp 126° (0.025 mm), $n^{25}D$ 1.5716. *Anal.* ($C_{15}H_{15}NO_2$) C, H, N.

N-Benzoyl-N-benzyl-O-2-propynylhydroxylamine (**15**) was prepared as described for **18**, using 18 g (0.072 mole) of **27** and 8.6 g (0.072 mole) of 3-bromopropyne in 250 ml of MeCOEt; yield 15.3 g (80%) of a white crystalline solid, mp 59–60° (from EtOH–H_2O). *Anal.* ($C_{17}H_{15}NO_2$) C, H, N.

N-benzoyl-N-2-propynyl-O-methylhydroxylamine (**29**) was prepared by a method similar to that described by Nicolaus and co-workers[20] for N-alkylation of O-substituted hydroxyurethans. A stirred mixture of 2 g (0.014 mole) of **21**, 8 g (0.066 mole) of 3-bromopropyne, and 9 g (0.066 mole) of K_2CO_3 in 30 ml of anhydrous Me_2CO was heated under reflux for 8 hr. After cooling, the dark brown reaction mixture was evaporated at 40° under reduced pressure; the residual brown semisolid was taken up in 50 ml of H_2O and this solution was extracted with three 50-ml portions of Et_2O; the combined extracts were dried ($MgSO_4$) and filtered, and Et_2O was removed from the filtrate under reduced pressure. The residual yellow liquid was distilled at 82–83° (0.02 mm) to yield 2 g (82%) of a light yellow liquid, $n^{25}D$ 1.5382. *Anal.* ($C_{11}H_{11}NO_2$) C, H, N.

N-Benzoyl-N-2-propynyl-O-benzylhydroxylamine (**16**) was prepared from **22** and 3-bromopropyne as described for **29**; yield 85% of a white solid, mp 49–50° (from Et_2O–hexane). *Anal.* ($C_{17}H_{15}NO_2$) C, H, N.

N,O-Dialkylhydroxylamine Hydrochlorides (**2, 3, 6, 7, 9, 10·HCl**).—A solution of 0.025 mole of the appropriate N,O-dialkylbenzohydroxamic acid (**13–17, 29**) in 20 ml of 6% EtOH–HCl[21] was heated under reflux for 2 hr. The reaction mixture was taken to dryness at 40° under reduced pressure, leaving a tan semisolid which was washed several times with C_6H_6. The resulting solid was recrystallized (see Table II).

N,O-Dialkylhydroxylamines (**2, 3, 6, 7, 10**).—An aqueous solution of the HCl salt was treated with excess solid K_2CO_3, followed by extraction with three 50-ml portions of Et_2O; the combined extracts were dried ($MgSO_4$) and filtered, and Et_2O was removed from the filtrate under reduced pressure. The residual liquid was distilled (see Table II).

N-Benzyl-N-2-propynyl-O-methylhydroxylamine (**4**).—To a stirred mixture of 1 g (0.012 mole) of **10** and 1.7 g (0.012 mole) of K_2CO_3 in 15 ml of anhydrous EtOH was added dropwise over 0.5 hr a solution of 2 g (0.012 mole) of benzyl bromide in 10 ml of anhydrous EtOH; the reaction mixture was heated under reflux for 15 hr after addition was complete. It was then taken to dryness at 40° under reduced pressure, leaving an orange semisolid which was dissolved in 50 ml of H_2O. This solution was extracted with three 30-ml portions of Et_2O; the combined extracts were dried ($MgSO_4$) and filtered, and Et_2O was removed from the filtrate under reduced pressure. The orange liquid residue was distilled at 46–47° (0.1 mm) to yield 1.2 g (70%) of a colorless liquid, $n^{25}D$ 1.5118. *Anal.* ($C_{11}H_{13}NO$) C, H, N.

N-Methyl-N-2-propynyl-O-benzylhydroxylamine (**8**).—To a stirred mixture of 2 g (0.015 mole) of **6** and 2.1 g (0.015 mole) of anhydrous K_2CO_3 in 15 ml of anhydrous Me_2CO was added dropwise over 0.5 hr a solution of 1.8 g (0.015 mole) of 3-bromopropyne in 10 ml of anhydrous Me_2CO; the resulting mixture was heated under reflux for 8 hr after addition was complete. It was then taken to dryness at 40° under reduced pressure, leaving a yellow semisolid which was dissolved in 50 ml of H_2O. This solution was extracted with three 30-ml portions of Et_2O; the combined extracts were dried ($MgSO_4$) and filtered, and Et_2O was removed from the filtrate under reduced pressure. The yellow liquid residue was distilled at 53–54° (0.2 mm) to yield 2.1 g (80%) of a colorless liquid, $n^{25}D$ 1.5101. *Anal.* ($C_{11}H_{13}NO$) C, H, N.

N-2-Propynylisoindoline Hydrochloride (**11·HCl**).—A solution of 33 g (0.18 mole) of N-2-propynylphthalimide (Aldrich Chemical

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(21) Prepared by diluting 7.5 ml of concentrated HCl with anhydrous EtOH to make 55 ml. For **3**, 7.5 ml of concentrated HCl was diluted with anhydrous MeOH to make 55 ml.

TABLE II
HYDROXYLAMINE DERIVATIVES AND SALTS

R'NOR''

R

No.	R	R'	R''	Bp (oom) or mp, °C	Yield, %	$n^{25}D$	Formula	Analyses
2	$CH_2C_6H_5$	H	CH_3	86 (10)		1.5126	$C_8H_{11}NO$	C, H, N
2·HCl				168–169[a]	83		$C_8H_{12}ClNO$	C, H, Cl, N
3	$CH_2C_6H_5$	H	$CH_2C{\equiv}CH$	58–59 (0.1)		1.5256	$C_{10}H_{11}NO$	C, H, N
3·HCl				135–136 dec[a]	60		$C_{10}H_{12}ClNO$	C, H, Cl, N
6	CH_3	H	$CH_2C_6H_5$	88 (10)[b]		1.5114		
6·HCl				98–99[d]	86			
7	$CH_2C{\equiv}CH$	H	$CH_2C_6H_5$	56–57 (0.1)		1.5287	$C_{10}H_{11}NO$	C, H, N
7·HCl				104–105[a]	73		$C_{10}H_{12}ClNO$	C, H, Cl, N
9·HCl	CH_3	H	$CH_2C{\equiv}CH$	59–60[a]	50		C_4H_8ClNO	C, H, Cl, N
9·HBr				68–69[b]	71		C_4H_8BrNO	C, H, Br, N
10	$CH_2C{\equiv}CH$	H	CH_3	52–53 (60)		1.4332	C_4H_7NO	C, H, N
10·HCl				114–115[b]	80		C_4H_8ClNO	C, H, Cl, N

[a] From 2-PrOH. [b] From $CHCl_3$–ether. [c] Lit.[11] bp 94–95° (15 mm). [d] Lit.[11] mp 97–99°.

C_6H_5) in 450 ml of purified[22] THF was added dropwise over 1 hr to a stirred slurry of 20 g (0.53 mole) of $LiAlH_4$ in 300 ml of THF; the reaction mixture was heated under reflux for 2 hr after addition was complete. After cooling in an ice bath, 100 ml of H_2O was added dropwise. The insoluble salts then were removed by filtration and were washed several times with Et_2O. The combined filtrate and washings were evaporated at 40° under reduced pressure, leaving a brown liquid which was distilled at 80° (0.4 mm) to yield 15.7 g (56%) of a light yellow liquid, $n^{25}D$ 1.5535. A solution of this liquid in anhydrous Et_2O was treated with ethereal HCl; the resulting brown solid was recrystallized from *i*-PrOH to afford 19 g (55%) of a white crystalline solid, mp 191–192°. *Anal.* ($C_{11}H_{12}ClN$) C, H, Cl, N.

N-Methyl-O-2-propynylhydroxylamine hydrobromide (9·HBr) was prepared from **17** as described for **9·HCl**, using 6% HBr in MeOH[23] (see Table II).

Reaction of N-Benzoyl-O-2-propynylhydroxylamine (18) with $LiAlH_4$.—To a stirred slurry of 5.7 g (0.15 mole) of $LiAlH_4$ in 150 ml of anhydrous Et_2O was added, by means of a Soxhlet extractor, 8.5 g (0.05 mole) of **18**; the reaction mixture was stirred under reflux for 2 hr after addition was complete. The cooled reaction mixture was decomposed by dropwise addition of 10 ml of H_2O; the insoluble inorganic salts were removed by filtration and were washed several times with Et_2O. The combined filtrate and washings were dried ($MgSO_4$) and filtered, and Et_2O was removed from the filtrate under reduced pressure. The residual viscous yellow liquid was distilled at 85° (0.4 mm) to give 4.2 g (69%) of a light yellow liquid whose ir spectrum ($CHCl_3$) was superimposable upon an ir spectrum of an authentic sample of benzamide. Both the product of this reaction and the authentic sample of benzamide showed bp 288°.

Reaction of O-2-Propylbenzaldoxime (19) with $LiAlH_4$.—To a stirred slurry of 9.5 g (0.25 mole) of $LiAlH_4$ in 150 ml of anhydrous Et_2O was added dropwise over 1 hr 16 g (0.1 mole) of **19** in 150 ml of anhydrous Et_2O. The mixture was stirred under reflux for 5 hr after addition was complete, then 25 ml of H_2O was added. The inorganic salts were collected on a filter and were washed with Et_2O. The combined filtrate and washings were dried ($MgSO_4$) and filtered, and Et_2O was removed from the filtrate at 25° under reduced pressure leaving a yellow liquid which was distilled. Two fractions were collected: bp 40° (50 mm) and bp 100° (50 mm). An ir spectrum (neat) of the lower boiling fraction (3.5 g, 62%) was identical with a spectrum of an authentic sample of 2-propyn-1-ol; an ir spectrum (neat) of the higher boiling fraction (6.9 g, 65%) was superimposable upon an ir spectrum of an authentic sample of benzylamine.

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(22) Refluxed over NaOH for 4 hr, then over $LiAlH_4$ for 1 hr, followed by distillation from $LiAlH_4$.

(23) Prepared by diluting 6 ml of 48% HBr with anhydrous MeOH to make 70 ml.