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Received June 12, 1985

Aryl aldehydes I reacted with α -tetralone to give the corresponding 2-arylidene-1-tetralone II. Condensation of the latter chalcones with hydrazine, methylhydrazine and phenylhydrazine produced the corresponding benzo[g]indazoles III, V and VI respectively. Acetylation of the 2H-benz[g]indazole derivatives III gave the corresponding 2-acetylated compounds IV. The structure of all products was elucidated by chemical and spectroscopic methods.

J. Heterocyclic Chem., **23**, 135 (1986).

The reaction of hydrazines with different chalcones was investigated [1-3]. The present work describes the reaction of hydrazine and its derivatives with exocyclic α,β -unsaturated cyclic ketones. It intends also to establish the structure of the products by both chemical and spectral methods. Thus different aromatic and heterocyclic aldehydes Ia-i, were condensed with 1-tetralone to give the corresponding 2-arylidene-1-tetralones IIa-i. The structure of these chalcones is evident from their spectral data (cf. Table 1). The infrared spectra show two strong absorption bands which are characteristic for α,β -unsaturated carbonyl compounds [4a]. The electronic spectra show absorp-

tion bands attributed to the conjugated system of the *trans*- α,β -unsaturated carbonyl compounds [5-7]. Most of the cyclic compounds appear to belong to the *trans*-configuration [8,9]. The nmr-spectra reveals further support to their structures and reveal multiplets in the region δ 2.40-3.40 ppm which stand for the $\text{CH}_2\text{-CH}_2$ groups. Other signals are attributed to the vinylic and aromatic protons (cf. Table 1). The mass spectra of the above chalcones are also in favour of their structure. Those of IIa,f,g and h show molecular ion peaks at m/e 234 (86.34%), m/e 269 (39.65%), m/e 236 (19.85%) and m/e 240 (100%) respectively.

Table 1

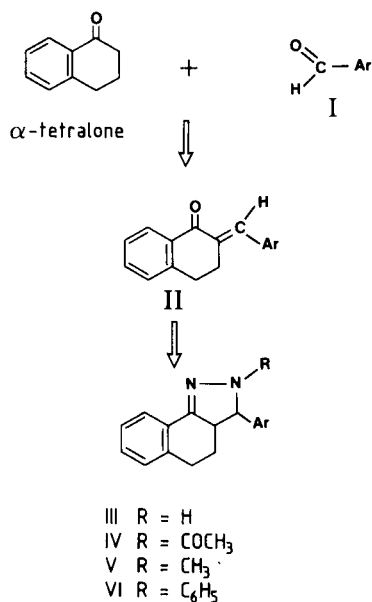
The Infrared, Electronic and Nuclear Magnetic Resonance Spectral Data of Compounds II-VI

Compound	Infrared Spectra (potassium bromide)		Electronic Spectra (Ethanol)		NMR (Deuteriochloroform)		J in Hz
	cm^{-1}	ν	λ max (nm)	ϵ	δ	Assignment (No. of protons)	
IIa	1590 (s)		305	14350	2.86-3.18 (m)	(4) $\text{-CH}_2\text{-CH}_2\text{-}$	
	1605 (s)	C=C	275	10240	7.88 (s)	(1) =CH	
	1660 (s)	C=O	225	9945	7.20-8.20 (m)	(9) Ar-H	
IIb	1600 (s)	C=C	335	6100	2.85-3.18 (m)	(4) $\text{-CH}_2\text{-CH}_2\text{-}$	
	1665 (s)	C=O	250	6230	3.80 (s)	(3) OCH_3	
					7.82 (s)	(1) =CH	
IIc					6.86-8.14	(8) Ar-H	
	1588 (s)		326	39120	2.38 (s)	(3) -CH_3	
	1600 (w)	C=C	270	15520	2.82-3.20 (m)	(4) $\text{-CH}_2\text{-CH}_2\text{-}$	
IIe	1650 (s)	C=O	242	11175	7.87 (s)	(1) =CH	
					7.17-8.18 (m)	(8) Ar-H	
	1595 (s)	C=C	310	35610	2.88-3.20 (m)	(4) $\text{-CH}_2\text{-CH}_2\text{-}$	
IIId	1668 (s)	C=O	273	16060	7.84 (s)	(1) =CH	
					7.27-8.30 (m)	(8) Ar-H	
					2.86-3.19 (m)	(4) $\text{-CH}_2\text{-CH}_2\text{-}$	
IIe	1600 (s)	C=C	310	14470	2.86-3.19 (m)	(4) $\text{-CH}_2\text{-CH}_2\text{-}$	
	1670 (s)	C=O	272	8265	7.84 (s)	(1) =CH	
			240	5425	7.24-8.23 (m)	(8) Ar-H	
IIIf	1590 (s)		321	24630	2.90-3.14 (m)	(4) $\text{-CH}_2\text{-CH}_2\text{-}$	
	1605 (m)	C=C	295	33590	7.79 (s)	(1) =CH	
	1665 (s)	C=O	227	24630	7.20-8.19 (m)	(8) Ar-H	
IIg	1600 (s)	C=C	394	27800	2.40-3.20 (m)	(4) $\text{-CH}_2\text{-CH}_2\text{-}$	
	1652 (s)	C=O	265	10000	3.73 (s)	(3) N-CH_3	
			225	7000	6.20-8.17 (m)	(8) Ar-H + =CH	
IIh	1600 (m)	C=C	352	20030	3.0-3.22 (m)	(4) $\text{-CH}_2\text{-CH}_2\text{-}$	
	1662 (s)	C=O	269	11815	7.08-8.08 (m)	(8) Ar-H + =CH	
	1600 (s)	C=C	353	17660	2.86-3.40 (m)	(4) $\text{-CH}_2\text{-CH}_2\text{-}$	
IIi	1665 (s)	C=O	260	7850	6.52-8.16 (m)	(8) Ar-H + =CH	

Table I continued

Compound	Infrared Spectra (potassium bromide)		Electronic Spectra (Ethanol)		NMR (Deuteriochloroform)		J in Hz
	cm ⁻¹	ν	λ max (nm)	ϵ	δ	Assignment (No. of protons)	
IIIa	1600 (s)		295	9315	1.30-3.68 (m)	(5) -CH ₂ -CH ₂ -CH	12
	1675 (s)	C=N	240	12050	4.80 (d)	(1) H ₃	
	3340 (s)	NH			5.81 (br)	(1) NH	
IIIb	1607 (s)	C=N	294	13115	7.02-8.0 (m)	(9) Ar-H	12
	3335 (s)	NH	224	20340	1.60-3.28 (m)	(5) -CH ₂ -CH ₂ -CH	
					3.76 (s)	(1) NH	
					3.82 (s)	(3) OCH ₃	
					4.47 (d)	(1) H ₃	
IIIc	1590 (s)	C=N	360	7435	6.87-8.0 (m)	(8) Ar-H	12
	1605 (s)				1.88-3.24 (m)	(5) -CH ₂ -CH ₂ -CH	
	3330 (s)	NH			2.36 (s)	(3) CH ₃	
					3.72 (s)	(1) NH	
					4.52 (d)	(1) H ₃	
				7.08-8.0 (m)	(8) Ar-H		

The above exocyclic α,β -unsaturated carbonyl compounds IIa-h were condensed with hydrazine hydrate to yield the corresponding 2H-benz[*g*]-3-arylhexahydroindazoles IIIa-h (*cf.* Scheme 1). The structures of these pro-



Compound	Ar	Compound	Ar	
I-VI	a	C ₆ H ₅	f	m-Cl-C ₆ H ₄
	b	p-OCH ₃ -C ₆ H ₄	g	C ₅ H ₆ N
	c	p-CH ₃ -C ₆ H ₄	h	C ₄ H ₃ S
	d	p-NO ₂ -C ₆ H ₄	i	C ₄ H ₃ O
	e	p-Cl-C ₆ H ₄		

ducts were substantiated from their spectral and chemical properties (*cf.* Tables 1 and 2). Thus, their infrared spectra show stretching vibrations which are characteristic for C=N and N-H groups [1,4b]. The electronic spectra of the benzindazoles III show absorption maxima which can be ascribed to $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$ transitions. The latter can

be correlated to the Ar-C=N-N-H chromophores [1,10].

The nmr spectra of compounds III show four main sets of chemical shifts. The (-CH₂-CH₂-CH-) moieties were represented by multiplets in the region δ 1.60-4.20 ppm. The doublet that appeared in the region δ 4.80-4.47 ppm stands for the H₃ (J = 12 Hz). The N-H protons were represented by one signal, in the range δ 3.72-5.81 ppm, which disappears upon treatment with deuterium oxide. The aromatic hydrogens showed multiplets in the range δ 6.87-8.0 ppm.

The mass spectra is also in favour of their structure. Thus compounds IIIa,h,g show three peaks at *m/e* 278 (100%) and *m/e* 254 (100%) and *m/e* 249 (100%) which represents both their parent and base peaks. The most prominent peaks of the IIIa and h were shown at *m/e* 277 (54.31%) and *m/e* 253 (46.13%) and represent the [M-1]⁺ ions.

Further insight concerning the structure of the 2H-benz[*g*]indazoles may be gleaned out from their chemical reactivity. Thus, their acetylation lead to the formation of the corresponding 2-acetylbenz[*g*]-3-arylhexahydroindazoles IVb-h.

The structure of these products was also established by chemical and spectral analyses (*cf.* Tables 1,2). The infrared spectra of compounds IV show stretching bands in the regions 1595-1620 cm⁻¹ and 1665-1690 cm⁻¹ attributed to C=N and C=O respectively [1]. The electronic spectra revealed absorption maxima which can be assigned to the $\pi \rightarrow \pi^*$ of the N-acetylated chromophore [10]. The nmr spectra were void of the signals representing the N-H proton. Instead, 3H singlets representing the protons of the N-acetyl group appeared in the range δ 2.08-2.96 ppm. Other protons in these compounds were represented by different chemical shifts (*cf.* Table 1). The mass spectra of IVg shows a molecular ion peak at *m/e* 291 (63,63%) and a base peak at *m/e* 56 (100%) corresponding to the ion [C₂H₂NO]⁺.

Table 1 continued

Compound	Infrared Spectra (potassium bromide)		Electronic Spectra (Ethanol)		NMR (Deuteriochloroform)		J in Hz
	cm ⁻¹	ν	λ max (nm)	ϵ	δ	Assignment (No. of protons)	
III d	1600 (s)	C=N	285	15190	—	—	
	3330 (s)	NH					
III e	1608 (m)	C=N	300	11690	1.72-3.20 (m)	(5) -CH ₂ -CH ₂ -CH	
	3360 (s)	NH	240	4350	3.72 (s)	(1) NH	12
			223	7885	4.50 (d)	(1) H ₃	
					7.20-8.0 (m)	(8) Ar-H	
III f	1598 (s)	C=N	243	5420	—	—	
	1675 (m)	NH					
	3300 (m)						
III g	1600 (w)	C=N	295	5000	1.20-3.57 (m)	(5) -CH ₂ -CH ₂ -CH	
	1615 (m)		225	6365	3.69 (s)	(3) N-CH ₃	12
					4.70 (s)	(1) N-H	
					4.60 (d)	(1) H ₃	
	3300 (s)	NH			6.0-8.0 (m)	(7) Ar-H	
III h	1585 (s)	C=N	300	15630	1.70-4.20 (m)	(5) -CH ₂ -CH ₂ -CH	
	1605 (s)		237	12715	3.76 (s)	(1) NH	12
	3340 (s)	NH			4.74 (d)	(1) H ₃	
					6.96-7.90 (m)	(7) Ar-H	
IV b	1595 (w)	C=N	285	10165	2.0-3.44 (m)	(5) -CH ₂ -CH ₂ -CH	
	1615 (w)		225	10780	2.96 (s)	(3) COCH ₃	10
	1690 (s)	C=O			3.74 (s)	(3) OCH ₃	
					4.90 (d)	(1) H ₃	
					6.74-8.0 (m)	(8) Ar-H	
					1.90-3.40 (m)	(5) -CH ₂ -CH ₂ -CH	
IV c	1615 (w)	C=N	291	11795	2.33 (s)	(3) COCH ₃	10
	1672 (s)	C=O			2.34 (s)	(3) CH ₃	
					4.92 (d)	(1) H ₃	
					7.0-8.0 (m)	(8) Ar-H	
					2.00-3.10 (m)	(5) -CH ₂ -CH ₂ -CH	
IV d	1610 (m)	C=N	289	19700	2.40 (s)	(3) COCH ₃	10
	1670 (s)	C=O			5.05 (d)	(1) H ₃	
					7.20-8.25 (m)	(8) Ar-H	
					1.90-3.40 (m)	(5) -CH ₂ -CH ₂ -CH	
					2.40 (s)	(3) COCH ₃	
IV e	1620 (m)	C=N	290	3857	4.92 (d)	(1) H ₃	10
	1665 (s)	C=O			7.05-8.25 (m)	(8) Ar-H	
					1.28-3.0 (m)	(5) -CH ₂ -CH ₂ -CH	
					2.08 (s)	(3) COCH ₃	
					4.80 (d)	(1) H ₃	
IV f	1600 (m)	C=N	295	3190	7.0-8.01 (m)	(8) Ar-H	10
	1680 (s)	C=O			1.43-3.60 (m)	(5) -CH ₂ -CH ₂ -CH	
					2.33 (s)	(3) COCH ₃	
					3.70 (s)	(3) N-CH ₃	
					5.00 (d)	(1) H ₃	
IV g	1610 (m)	C=N	290	6600	6.07-8.03 (m)	(7) Ar-H	10
	1670 (s)	C=O	220	7200	2.03-3.60 (m)	(5) -CH ₂ -CH ₂ -CH	
					2.37 (s)	(3) COCH ₃	
					5.27 (d)	(1) H ₃	
					6.15-8.0 (m)	(7) Ar-H	
V a	1585 (s)	C=N	310	5250	1.70-3.44 (m)	(5) -CH ₂ -CH ₂ -CH	12
	1600 (m)				2.80 (s)	(3) N-CH ₃	
					3.66 (d)	(1) H ₃	
					7.16-8.0 (m)	(9) Ar-H	
					1.60-3.20 (m)	(5) -CH ₂ -CH ₂ -CH	
V b	1585 (s)	C=N	313	18030	2.80 (s)	(3) N-CH ₃	12
	1610 (s)		227	12180	3.64 (d)	(1) H ₃	
					3.80 (s)	(3) OCH ₃	
					6.88-8.0 (m)	(8) Ar-H	

Table 1 continued

Compound	Infrared Spectra (potassium bromide)		Electronic Spectra (Ethanol)		NMR (Deuteriochloroform)		J in Hz
	cm ⁻¹	ν	λ max (nm)	ϵ	δ	Assignment (No. of protons)	
Vc	1585 (s)	C=N	—	—	1.70-3.36 (m)	(5) -CH ₂ -CH ₂ -CH	12
	1610 (s)				2.84 (s)	(3) Ar-CH ₃	
Vd	1585 (w)	C=N	300	13890	2.88 (s)	(3) N-CH ₃	12
	1600 (w)				3.74 (d)	(1) H ₃	
Ve	1585 (m)	C=N	315	7110	7.24-8.08 (m)	(8) Ar-H	12
	1610 (m)				2.60-3.40 (m)	(5) -CH ₂ -CH ₂ -CH	
Vf	1585 (s)	C=N	312	16585	3.10 (s)	(3) N-CH ₃	12
	1595 (m)				3.84 (d)	(1) H ₃	
Vg	1587 (m)	C=N	312	10195	7.20-8.28 (m)	(8) Ar-H	12
	1605 (m)				1.60-3.86 (m)	(5) -CH ₂ -CH ₂ -CH	
Vh	1585 (s)	C=N	311	16100	2.80 (s)	(3) N-CH ₃	12
	1610 (s)				7.19-8.0 (m)	(8) Ar-H	
VIa	1600 (s)	C=N	345	21360	1.70-3.60 (m)	(5) -CH ₂ -CH ₂ -CH	12
					2.80 (s)	(3) N-CH ₃	
VIb	1600 (s)	C=N	345	17380	3.95 (d)	(1) H ₃	12
					246	6.92-8.0 (m)	
VIc	1600 (s)	C=N	347	41600	2.0-3.44 (m)	(5) -CH ₂ -CH ₂ -CH	12
					247	4.62 (d)	
VId	1598 (s)	C=N	330	17945	6.80-8.12 (m)	(14) Ar-H	12
					295	1.80-3.44 (m)	
VIe	1598 (s)	C=N	340	16150	3.74 (s)	(3) OCH ₃	12
					246	4.74 (d)	
VI f	1600 (s)	C=N	343	9270	6.84-8.10 (m)	(13) Ar-H	12
					4.50 (d)	(1) H ₃	
VIg	1600 (s)	C=N	351	12865	1.90-3.40 (m)	(5) -CH ₂ -CH ₂ -CH	12
					300 (sh)	2.34 (s)	
VIh	1600 (s)	C=N	339	17635	4.58 (d)	(1) H ₃	12
					224	6.80-8.12 (m)	

The condensation of the chalcones II with methyl and phenyl hydrazines revealed the formation of 2-methyl and 2-phenylbenz[*g*]-3-arylhexahydroindazoles Va-i and VIa-h respectively. The structure of these products was established by chemical and spectral analyses (*cf.* Tables 1,2). The infrared spectra show stretching vibrations which stand for C=N in the systems [1,4b]. The electronic spectra of these systems show absorption maxima ascribed to the π

$\rightarrow \pi^*$ transition of the chromophores Ar-C=N-N-R [1,10]. It can be envisaged that the *N*-phenyl substituent of the indazoles VI showed red shifts, which is in good agreement with previous observations [1,10]. The nmr spectra of compounds V were characterized by 3H singlets in the range δ 2.80-3.10 ppm, which stand for the N-CH₃ group of the indazole system. On the other hand, the spectra of all compounds V and VI revealed doublets ($J = 12$ Hz) which can

Table 2
Yields, Melting Points and Elemental Analyses of Compounds II-VI

Compound No.	Yield (%)	Mp °C	Formula	Calcd. %					Found %				
				C	H	N	Cl	S	C	H	N	Cl	S
IIa	82	107	C ₁₇ H ₁₄ O	87.15	6.02	—	—	—	87.05	5.97	—	—	—
IIb	85	109	C ₁₈ H ₁₆ O ₂	81.79	6.10	—	—	—	82.09	6.00	—	—	—
IIc	79	125	C ₁₈ H ₁₆ O	87.06	4.49	—	—	—	87.12	6.35	—	—	—
IId	75	185	C ₁₇ H ₁₃ NO ₃	73.11	4.69	5.01	—	—	72.91	4.59	4.91	—	—
IIe	87	141	C ₁₇ H ₁₃ ClO	75.98	4.87	—	13.19	—	75.92	4.69	—	13.07	—
IIf	81	111	C ₁₇ H ₁₃ ClO	75.98	4.87	—	13.19	—	75.95	5.01	—	13.20	—
IIg	90	126-127	C ₁₆ H ₁₅ NO	80.98	6.37	5.90	—	—	80.84	6.14	5.78	—	—
IIh	80	92	C ₁₅ H ₁₂ OS	74.96	5.03	—	—	13.34	74.81	4.96	—	—	13.60
IIi	87	73	C ₁₅ H ₁₂ O ₂	80.33	5.39	—	—	—	80.21	5.31	—	—	—
IIIa	90	83	C ₁₇ H ₁₆ N ₂	82.22	6.49	11.28	—	—	81.93	6.29	11.29	—	—
IIIb	92	147	C ₁₈ H ₁₈ N ₂ O	77.63	6.51	10.06	—	—	77.73	6.34	9.83	—	—
IIIc	92	126	C ₁₈ H ₁₈ N ₂	82.40	6.91	10.67	—	—	82.31	6.86	10.55	—	—
IIId	87	241-242	C ₁₇ H ₁₅ N ₃ O ₂	69.61	5.15	14.32	—	—	69.50	5.04	13.97	—	—
IIIe	88	175	C ₁₇ H ₁₅ ClN ₂	72.21	5.34	9.90	12.53	—	72.18	5.25	9.70	12.50	—
IIIf	85	100	C ₁₇ H ₁₅ ClN ₂	72.21	5.34	9.90	12.53	—	72.08	5.49	9.77	12.51	—
IIIg	93	80	C ₁₆ H ₁₇ N ₃	76.46	6.81	16.71	—	—	76.31	6.56	16.68	—	—
IIIh	90	105	C ₁₅ H ₁₄ N ₂ S	70.76	5.54	11.01	—	12.60	70.87	5.43	11.30	12.51	—
IVb	88	144-145	C ₂₀ H ₂₀ N ₂ O ₂	74.97	6.29	8.74	—	—	74.86	6.21	8.56	—	—
IVc	85	80	C ₂₀ H ₂₀ N ₂ O	78.91	6.62	9.20	—	—	78.90	6.59	8.92	—	—
IVd	87	180-182	C ₁₅ H ₁₇ N ₃ O ₃	68.04	5.11	12.53	—	—	67.91	5.09	12.40	—	—
IVe	84	176-177	C ₁₅ H ₁₇ ClN ₂ O	70.26	5.27	8.62	10.91	—	70.70	5.24	8.49	10.69	—
IVf	82	oil	C ₁₅ H ₁₇ ClN ₂ O	70.26	5.27	8.62	10.91	—	70.17	5.15	8.51	10.81	—
IVg	90	115	C ₁₈ H ₁₉ N ₃ O	73.69	6.52	14.32	—	—	73.51	6.48	14.19	—	—
IVh	91	106	C ₁₇ H ₁₆ N ₂ OS	68.89	5.44	9.44	—	10.79	68.69	5.43	9.38	—	10.51
Va	87	137	C ₁₈ H ₁₈ N ₂	82.40	6.91	10.67	—	—	82.49	6.90	10.60	—	—
Vb	86	180-182	C ₁₉ H ₂₀ N ₂ O	78.05	6.89	9.58	—	—	77.94	6.87	9.57	—	—
Vc	88	152-153	C ₁₉ H ₂₀ N ₂	82.56	7.29	10.13	—	—	82.43	7.16	10.02	—	—
Vd	84	233-235	C ₁₈ H ₁₇ N ₃ O ₂	70.34	5.57	13.67	—	—	70.08	5.56	13.48	—	—
Ve	81	195-196	C ₁₈ H ₁₇ ClN ₂	72.84	5.77	9.43	11.94	—	72.81	5.73	9.37	11.91	—
Vf	82	120-121	C ₁₈ H ₁₇ ClN ₂	72.84	5.77	9.43	11.94	—	72.79	5.72	9.40	11.92	—
Vg	89	96	C ₁₇ H ₁₅ N ₃	76.94	7.21	15.83	—	—	76.76	7.18	15.64	—	—
Vh	87	131-132	C ₁₆ H ₁₆ N ₂ S	71.60	6.01	10.43	—	11.94	71.48	5.95	10.39	—	11.83
Vi	80	85	C ₁₈ H ₁₆ N ₂ O	76.16	6.39	11.10	—	—	76.15	6.28	11.07	—	—
VIa	80	157-158	C ₂₃ H ₂₀ N ₂	85.15	6.21	8.63	—	—	85.03	6.14	8.61	—	—
VIb	82	165-166	C ₂₄ H ₂₂ N ₂ O	81.32	6.25	7.90	—	—	81.32	6.19	7.79	—	—
VIc	84	163-164	C ₂₄ H ₂₂ N ₂	85.17	6.55	8.27	—	—	85.07	6.52	8.39	—	—
VId	79	124-125	C ₂₃ H ₁₉ N ₃ O ₂	74.77	5.18	11.37	—	—	74.61	5.28	11.15	—	—
VIe	82	155-156	C ₂₃ H ₁₉ ClN ₂	76.97	5.33	7.80	9.87	—	76.76	5.14	7.72	10.04	—
VI f	81	160-161	C ₂₃ H ₁₉ ClN ₂	76.97	5.33	7.80	9.87	—	76.68	5.35	8.05	10.03	—
VIg	88	151-152	C ₂₂ H ₂₁ N ₃	80.70	6.46	12.83	—	—	80.51	6.32	12.75	—	—
VIh	87	159-160	C ₂₁ H ₁₈ N ₂ S	76.33	5.49	8.47	—	9.70	76.21	5.38	8.46	—	9.64

be assigned to the protons at position three (H₃) and two multiplets that can be ascribed to the aryl and (CH₂-CH₂-CH-) moieties.

The mass spectra lends further support to the structure of the latter compounds. Those of Va,f,h show molecular ion peaks at m/e 262 (100%), m/e 297 (22.62%) and m/e 268 (100%) respectively. It is apparent that the molecular ion peaks of Va,h represent also their base peaks. The base peak of Vf was represented by a signal at m/e 185 (100%) which stand for the ion [M-C₆H₄Cl]⁺. The mass spectra of compounds VIb,h showed signals at m/e 354 (100%) and m/e 330 (100%) which can be ascribed to both molecular ion and base peaks. It is worth mentioning that all the above compounds showed prominent peaks that

can be assigned to [M-1]⁺ ions.

It can be assumed that the formation of all the above indazole derivatives (III-VI) proceeds by the 1:2-addition of the hydrazines to the chalcones (II), followed by cyclization of the intermediate hydrazones [1-3,6,10-12]. The ease and high yield of these condensations are in good agreement with the proposed (*E*)-configuration of the chalcones II.

EXPERIMENTAL

Melting points were measured using a Bock-Monoscope M (thermal microscope), electronic and infrared spectra were run on Cary 17 and Perkin-Elmer 580B, respectively. The nmr and the mass spectra were carried out using Varian T60A and Varian MAT 311A, respectively. Micro-

analyses were determined by A. Bernhardt Microanalytical Laboratory, German Federal Republic.

Preparation of 2-Arylidene-1-tetralones IIa-i. General Procedure.

Equimolar amounts of the aldehydes (0.1 mole) and 1-tetralone (0.1 mole) in ethanol (100 ml) were treated with an aqueous solution of sodium hydroxide (5 g/10 ml water). Addition of the base was carried out during 20 minutes, and the mixture was stirred for further 3 hours. The precipitated product was filtered off and crystallized from hexane or cyclohexane. Thus, the aldehydes Ia-l were condensed with 1-tetralone to give 2-benzylidene-IIa, 2-*p*-methoxybenzylidene-IIb, 2-*p*-methylbenzylidene-IIc, 2-*p*-nitrobenzylidene-IId, 2-*p*-chlorobenzylidene-IIe, 2-*m*-chlorobenzylidene-IIf, 2-*N*-methylpyrrolylidene-IIg, 2-thienylidene-IIh and 2-furylidene-IIi 1-tetralones.

Condensation of the Hydrazines with 2-arylidene-1-tetralones II. General Procedure.

A mixture of the 2-arylidene-1-tetralone (0.01 mole) and hydrazine hydrate (0.02 mole) in ethanol (50 ml) was refluxed for 3 hours. The reaction mixture was concentrated under reduced pressure and left to cool. The precipitated product was filtered off and crystallized from cyclohexane, to give:

2*H*-Benz[*g*]-3-arylhexahydroindazoles IIIa-h.

The reaction was repeated using methyl hydrazine or phenyl hydrazine to obtain 2-methylbenz[*g*]-3-arylhexahydroindazoles IVa-i and 2-phenylbenz[*g*]-3-arylhexahydroindazoles VIa-h respectively. These were also crystallized from cyclohexane.

Acetylation of the Indazole Derivatives III.

A mixture of the indazole derivatives (1 g) and acetic anhydride (5 ml)

were refluxed for 5 hours. The product was poured over ice, and the precipitated solid was filtered off. Crystallization from hexane gave the corresponding 2-acetylbenz[*g*]-3-arylhexahydroindazoles IVb-h.

Acknowledgement.

This research is part of Research Project SC028 supported by Research Council, Kuwait University.

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