

Relative Reactivity in the Condensation of
2*H*-Isoindole- and 2*H*-Indazole-4,7-dione Derivatives
with *o*-Aminobenzenethiol and its Derivatives

Seiko Nan'ya*, Kaname Katsuraya, Yoshio Ueno and Eturô Maekawa

Department of Applied Chemistry, Nagoya Institute of Technology, Gokiso, Showa-ku,
Nagoya-shi 466, Japan

Received March 25, 1988

The effects of substituents on the condensation of *o*-aminobenzenethiol derivatives with 2*H*-isoindole- and 2*H*-indazole-4,7-dione derivatives were studied by competitive reactions.

J. Heterocyclic Chem., **25**, 1051 (1988).

Recently we reported the synthesis of 4*H*-pyrrolo- and 4*H*-pyrazolophenothiazin-4-one derivatives [1,2], in which the effect of the substituents on the substrate on the ease of the reactions was observed.

In this communication, the relative reactivities of *o*-aminobenzenethiol and its derivatives **1a-c** as well as 2*H*-isoindole-, **2d,e** and 2*H*-indazole-4,7-dione derivatives **3d-f** were measured by competitive reactions between the substrates in ethanol at $30 \pm 0.2^\circ$ in decreasing orders: for *o*-aminobenzenethiol derivatives, **1a**, **1c**, **1b**; and for 2*H*-isoindole- and 2*H*-indazole-4,7-dione derivatives, **3d**, **3e**, **3f** and **2e**. In the presence of potassium acetate the 6-bromo derivatives ($R^2 = \text{Br}$ of **2** and **3**) were condensed with **1a** more easily than **3d** in the following decreasing order: **3e**, **3f**, **2e**, **3d**; no condensation cyclization occurred with **2d** [1]. This is due presumably to capturing of the eliminated bromide ion with potassium acetate. Regard-

less of absence or presence of potassium acetate, the *p*-bromo substituent of **5f** (R^3) caused a lag in the reaction compared with *p*-unsubstituted **5e**.

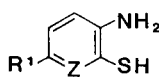
EXPERIMENTAL

The relative reactivity was measured on a JASCO Series 800 liquid chromatograph equipped with an hplc pump 880-PU, variable wavelength detector 875-UV and SIC Chromatocorder 11 using a JASCO SIL C₁₈ column (4.6 mm i.d. x 10 cm) using methanol.

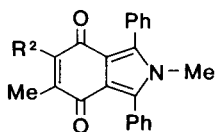
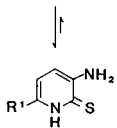
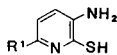
Measurement of the Relative Reactivity of *o*-Aminobenzenethiol Derivatives (**1a-c**) with **3d**.

(A) Competitive Reaction Between **1a** and **1c** with **3d**.

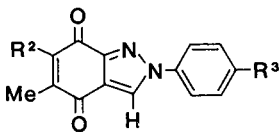
An equimolar mixture of **1a**, **1c** and **3d** in ethanol was stirred at $30 \pm 0.2^\circ$ for 1 hour. The resulting crystalline precipitate was filtered immediately and by pouring water into the mother liquor an additional precipitate was deposited. Conducting both of the precipitate in benzene to hplc **5ad** and **5cd** were obtained in the ratio of 2.7:1.0 by calibration with the known products **5ad** and **5cd**.



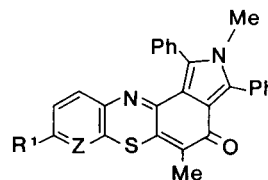
1



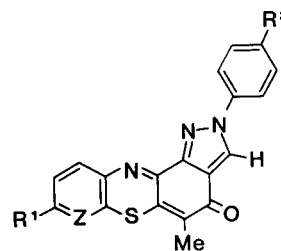
2



3



4



5

	Z	R ¹
a	CH	H
b	N	Cl
c	N	MeO

	R ²	R ³
d	H	H
e	Br	H
f	Br	Br

(B) By the reaction of **1b**, **1c** and **3d** as described above, **5bd** and **5cd** were obtained in the ratio of 1.0:2.8.

Consequently condensation of **3d** with **1a**, **1c** and **1b** took place in the ratio of 7.6:2.8:1.0.

Measurement of the Relative Reactivity of 2*H*-Isoindole- **2d,e** and 2*H*-Indazole-4,7-dione Derivatives **3d-f** with **1a**.

Procedure i: The same conditions were used as in (A). Procedure ii: In addition to i, twice molar quantity of potassium acetate were added.

(C) Reaction of **3d** and **3f** with **1a**.

i: Compounds **5ad** and **5af** were provided in the ratio of 3.3:1.0. ii: Compounds **5ad** and **5af** were obtained in the ratio of 1.0:3.8.

(D) Reaction of **3e** and **3f** with **1a**.

i: Compounds **5ae** (= **5ad**) and **5af** were obtained in the ratio of 1.3:1.0. ii: The ratio of **5ae** and **5af** was also 1.3:1.0.

(E) Reaction of **2e** and **3e** with **1a**.

i: Compounds **5ae** (= **5ad**) was obtained exclusively. The reaction of **2e** and **1a** afforded **4ae**. ii: Compounds **4ae** and **5ae** were produced in the ratio of 1.0:3.5. Consequently, condensation of **2e** and **3e-f** with **1a** occurred under the conditions i: **3d**, **3e**, **3f** (3.3:1.3:1.0) and ii: **3e**, **3f**, **2e**, **3d** (5.0:3.8:1.4:1.0).

REFERENCES AND NOTES

[1] S. Nan'ya, T. Tange and E. Maekawa, *J. Heterocyclic Chem.*, **23**, 1267 (1986).

[2] S. Nan'ya, K. Katsuraya, Y. Ueno and E. Maekawa, *J. Heterocyclic Chem.*, **25**, 109 (1988).