Supporting Information

Metal-Free Synthesis of 2-Substituted Quinazolines via Green Oxidation of *o*-Aminobenzylamines: Practical Construction of *N*-Containing Heterocycles Based on a Salicylic Acid-Catalyzed Oxidation System

Yuki Yamamoto¹, Chihiro Yamakawa¹, Riku Nishimura¹, Chun-ping Dong¹,

Shintaro Kodama^{1*}, Akihiro Nomoto¹, Michio Ueshima¹, and Akiya Ogawa^{1*}

¹Department of Applied Chemistry, Graduate School of Engineering, Osaka Prefecture University, 1-1 Gakuen-cho, Nakaku, Sakai, Osaka 599-8531, Japan

skodama@chem.osakafu-u.ac.jp, ogawa@chem.osakafu-u.ac.jp

CONTENTS

	Pages
Scheme S1. Comparison of the E-factor of some alternative methods for synthesis of	S 2
quinazolines and this work	~-
Figure S1. ¹ H NMR spectrum of crude 3aa after the reaction (entry 17 in Table 1)	S3
Table S1. Optimization of reaction conditions for salicylic acid-catalyzed oxidation of	S 3
benzylamine to the corresponding imine	33
Copies of ¹ H and ¹³ C{ ¹ H} NMR spectra of compounds 3aa–3ah , 3aj–3at , and 3ba	S4-S23
Copies of ¹ H and ¹³ C{ ¹ H} NMR spectra of compounds 4a–4d	S24-S27
Copies of ¹ H and ¹³ C{ ¹ H} NMR spectra of compounds 6a–6e , 8 , and 9	S28-S34

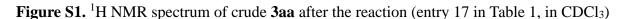
Scheme S1. Comparison of the E-factor of some alternative methods for synthesis of quinazolines and this work

(a) Previously reported methods for synthesis of quinazolines from amines • Chem. Commun. 2011, 47, 7818. (0.2 mmol) E-factor = 4.1 o-xylene (0.3 mL), 140 °C 4 h, O₂ (1 atm) (1 mmol) (3 mmol) 70% • RSC Adv. 2016, 6, 56892. NH₂ Mgl₂ (5 mol%) E-factor = 84.0 EtOAc (5 mL), O₂ (1 atm), irradiation (0.3 mmol) (0.3 mmol) 87% • Org. Biomol. Chem. 2016, 14, 10567. l₂ (10 mol%) E-factor = 2.4 neat, 80 °C, 5 h 83% (0.5 mmol) (2 mmol) • Tetrahedron Lett. 2017, 58, 2044. PhI(OAc)₂ (3.0 equiv.) E-factor = 26.9 CH₂Cl₂ (3 mL), rt, 1 h (1.0 mmol) (1.0 mmol) 90% • Asian J. Org. Chem. 2017, 6, 432. Rose bengal (0.5 mol%) E-factor = 41.2 DMF (1 mL), O₂ (1 atm) irradiation, 20 h (0.15 mmol) (0.45 mmol) 78% • Org. Biomol. Chem. 2017, 15, 5781. FeBr₂ (10 mol%) E-factor = 6.5chlorobenzene (1 mL), 110 °C, 16 h, O₂ (1 atm) (1.0 mmol) (1.3 mmol) 90% • Eur. J. Org. Chem. 2018, 4628. NO₂ (30 mol%) E-factor = 9.2 CH₃CN (2 mL), 110 °C 16 h, air (1.0 mmol) (1.0 mmol) 87% (b) This work (5 mol%) соон ÓН BF₃•Et₂O (10 mol%) E-factor = 2.7 DMSO (1.0 mL), 90 °C, 48 h, O₂ (0.1 MPa)

81%

(3.0 mmol)

(3.0 mmol)



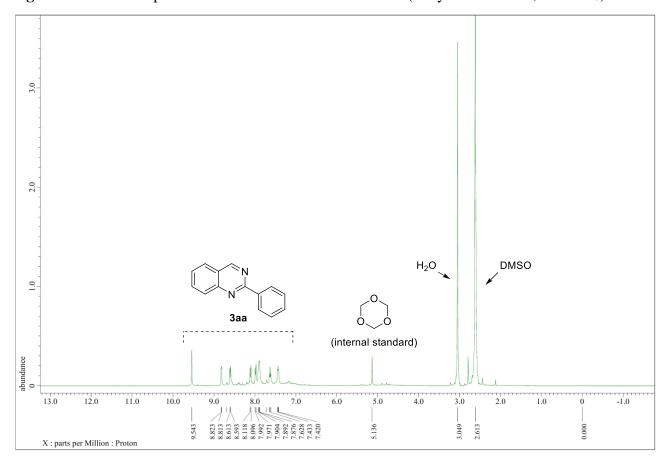
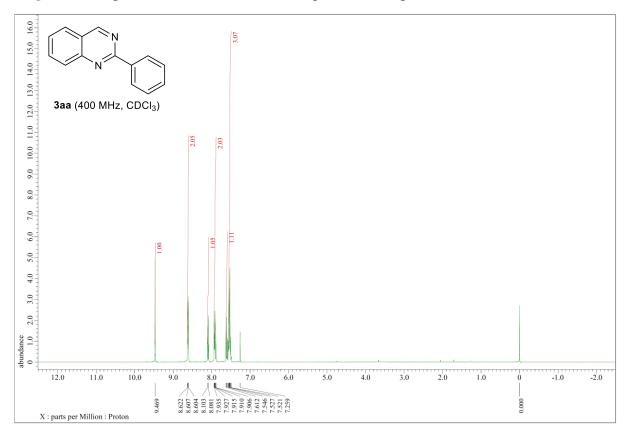


Table S1. Optimization of reaction conditions for salicylic acid-catalyzed oxidation of benzylamine to the corresponding imine

Entry	Additive (mg)	Time (h)	Yield 4a (%) ^a
1	-	2	14
2	-	4	26
3	-	16	79
4	-	24	73
5	4A MS (100)	16	98 (87)

^aYields were determined by ¹H NMR spectroscopy (isolated yield)

Figure S2: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3aa



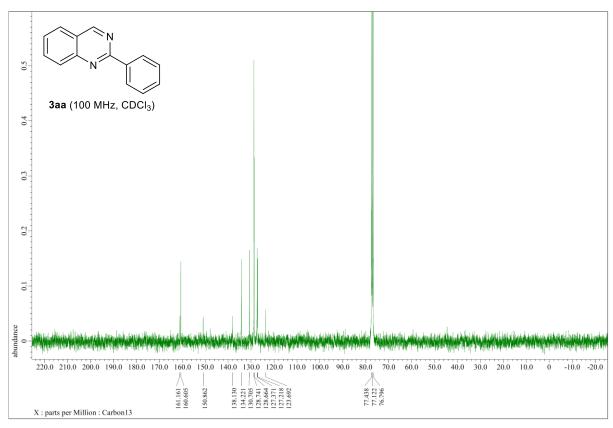
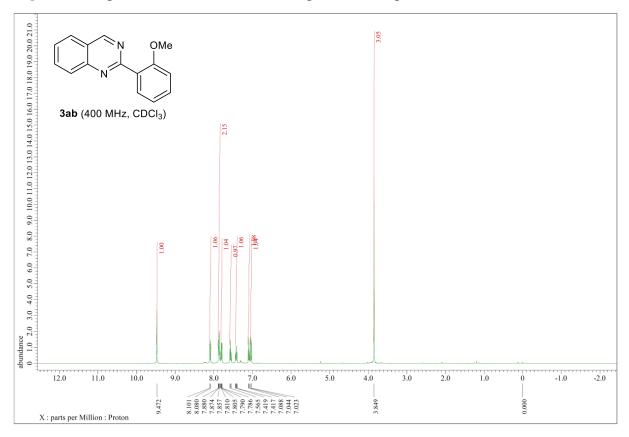


Figure S3: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3ab



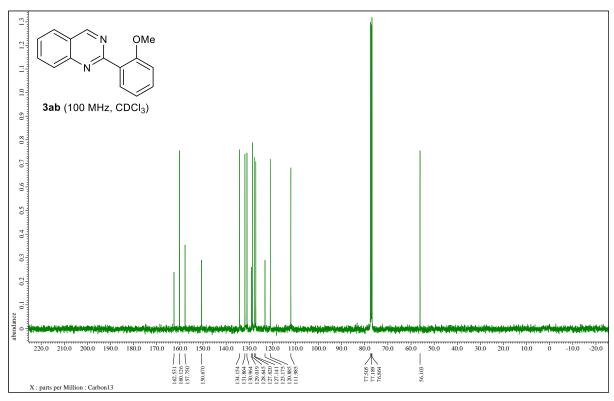
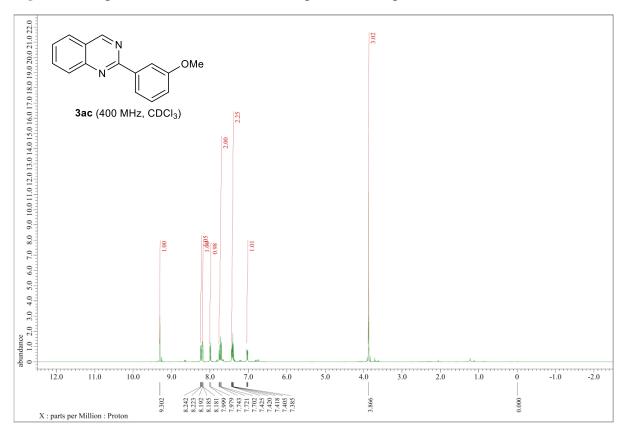


Figure S4: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3ac



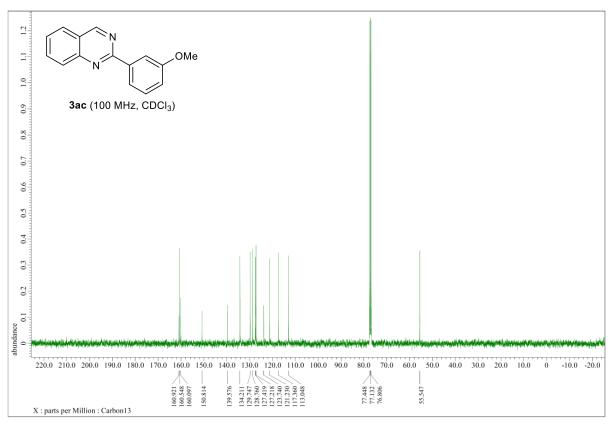
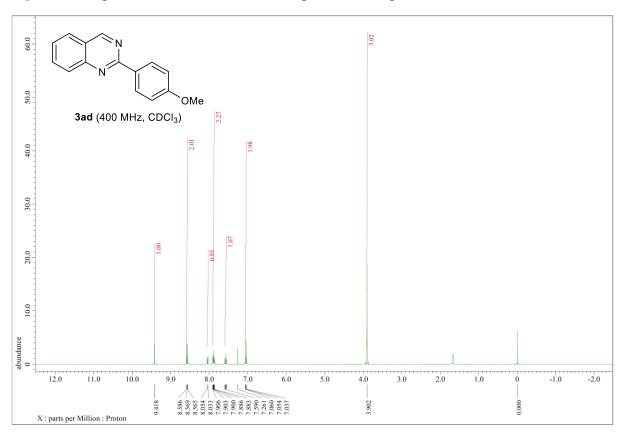


Figure S5: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3ad



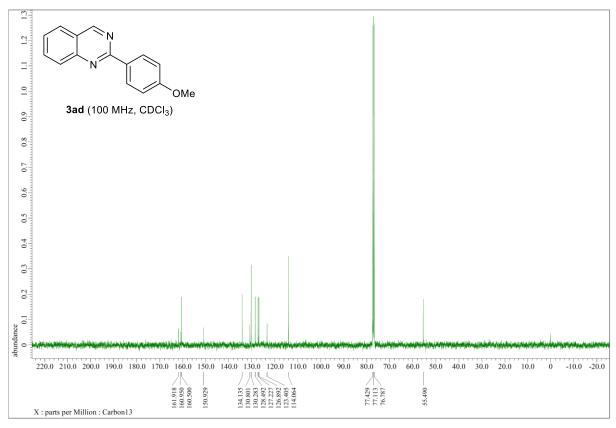
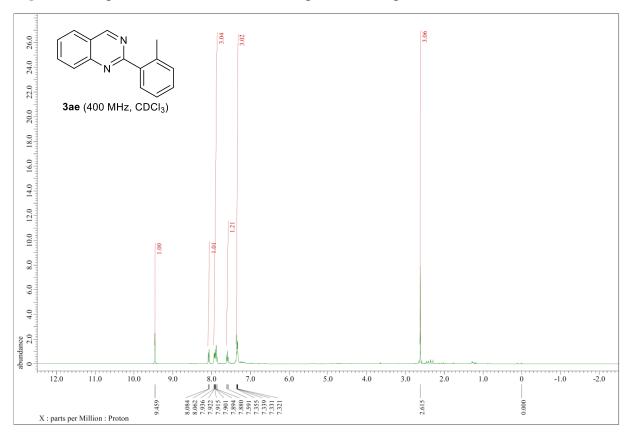


Figure S6: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3ae



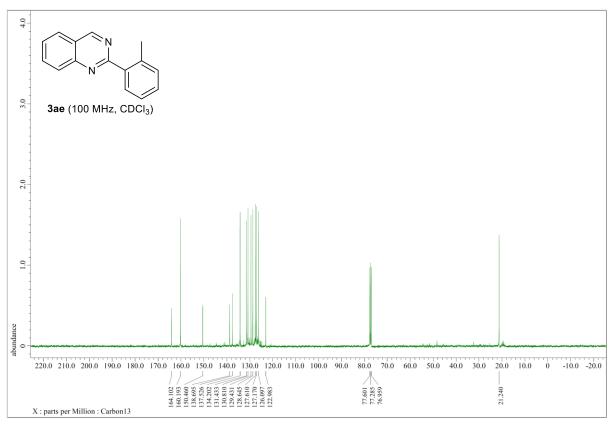


Figure S7: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3af

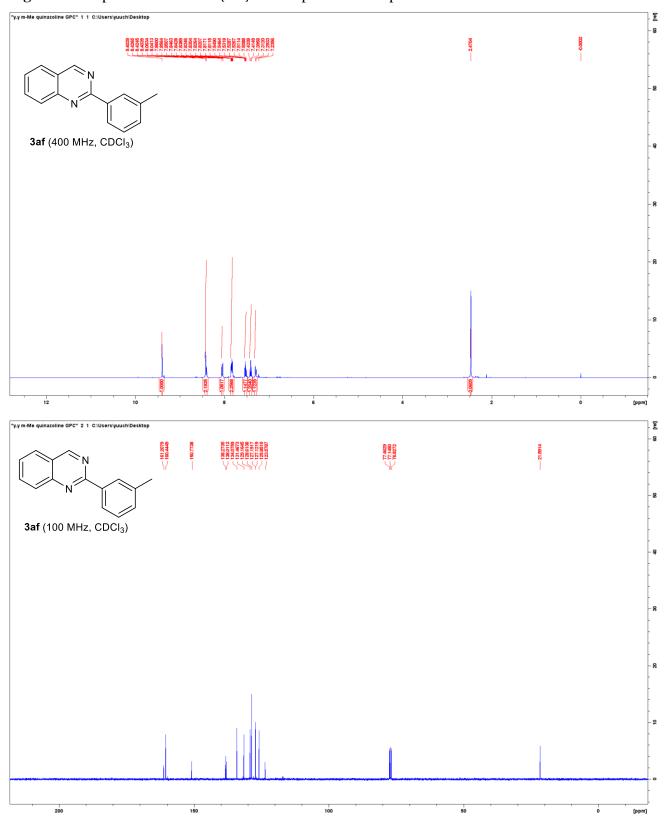
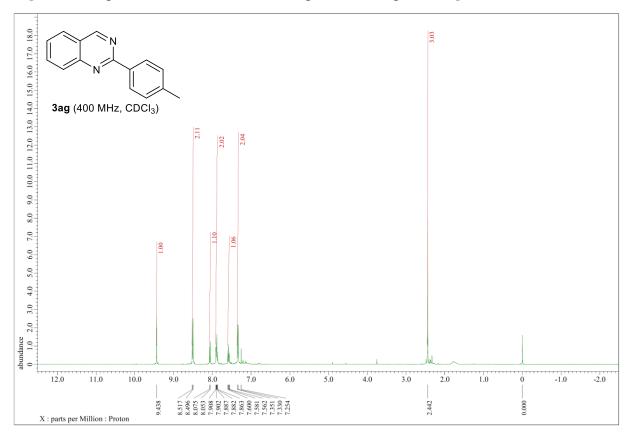


Figure S8: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3ag



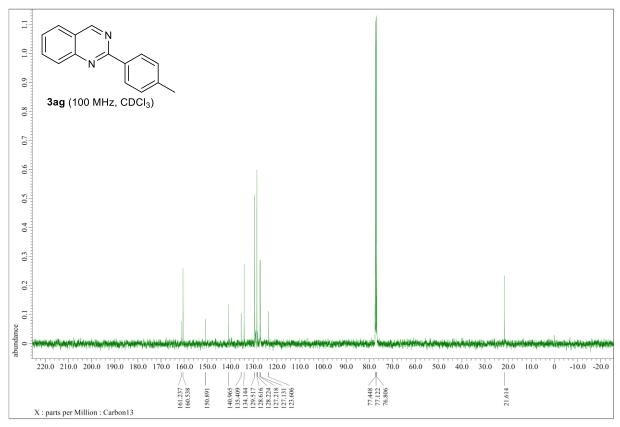
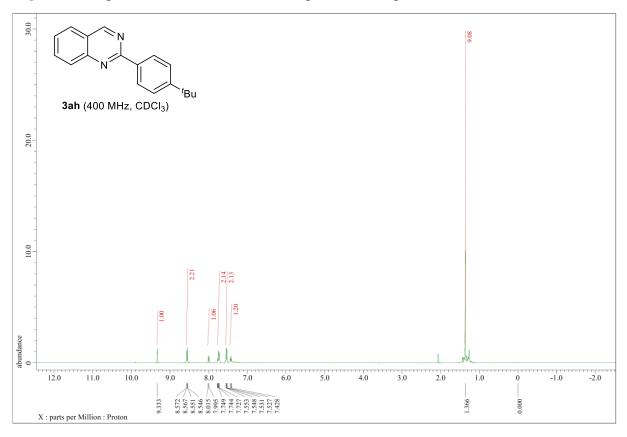


Figure S9: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3ah



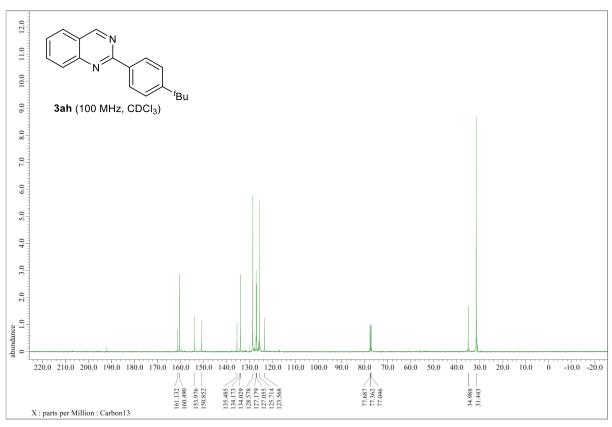


Figure S10: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3aj

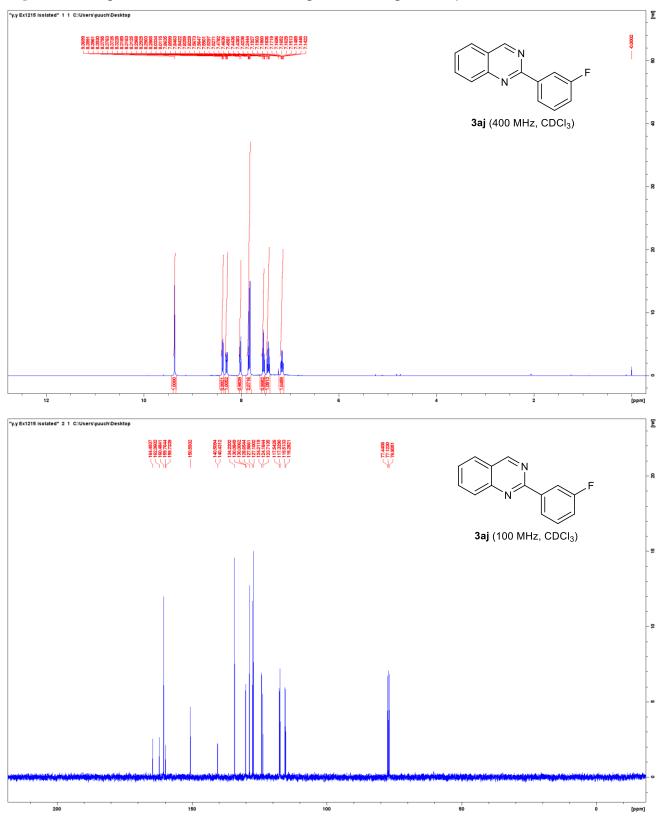


Figure S11: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3ak

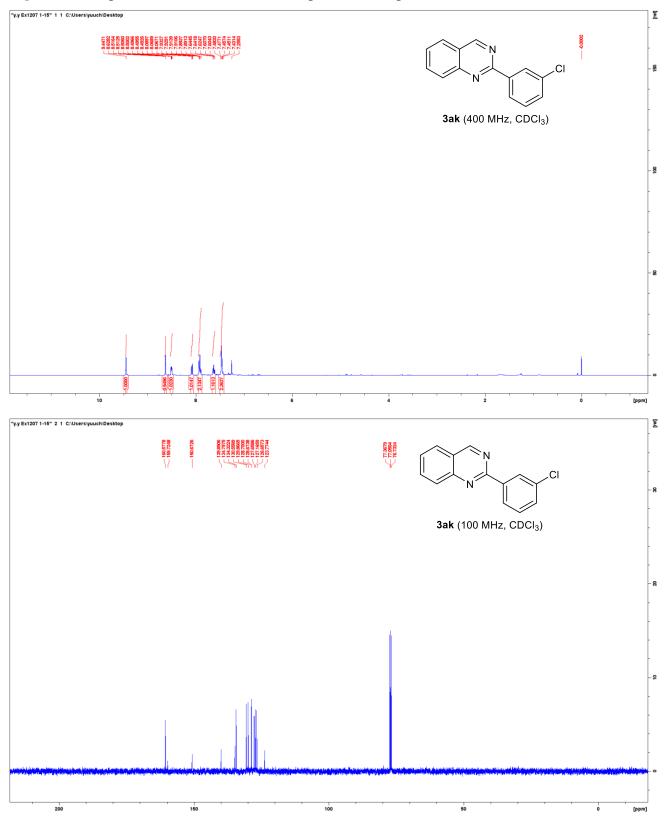
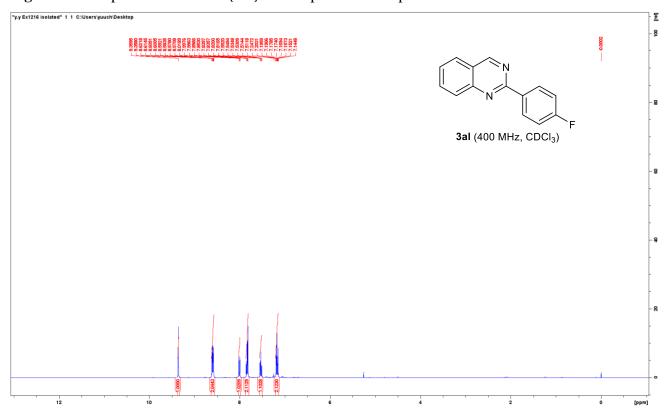


Figure S12: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3al



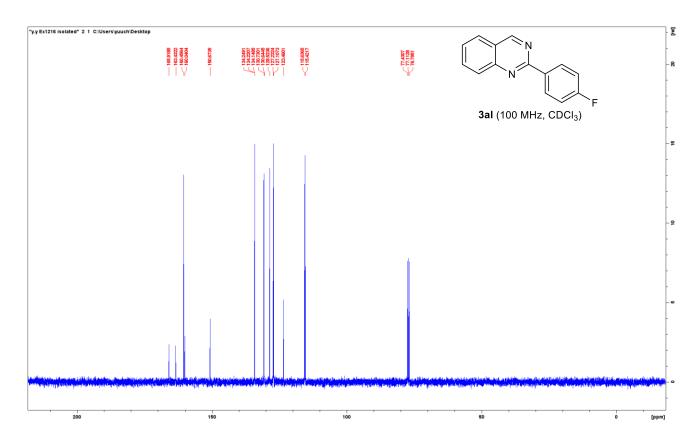
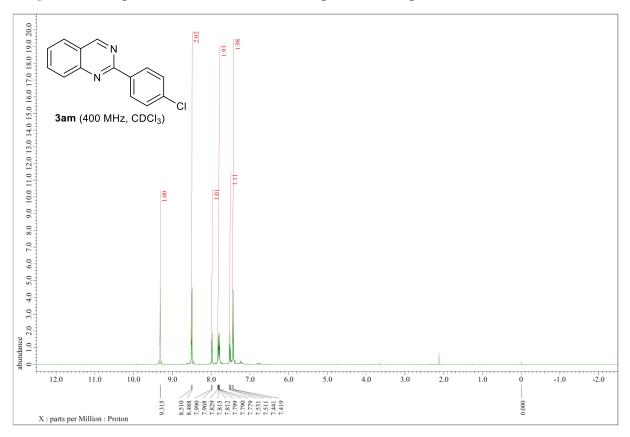


Figure S13: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3am



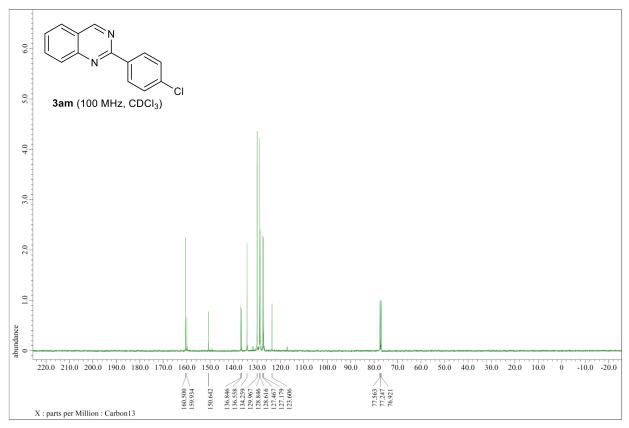


Figure S14: Copies of ¹H and ¹³C{¹H} NMR spectra of compound **3an**

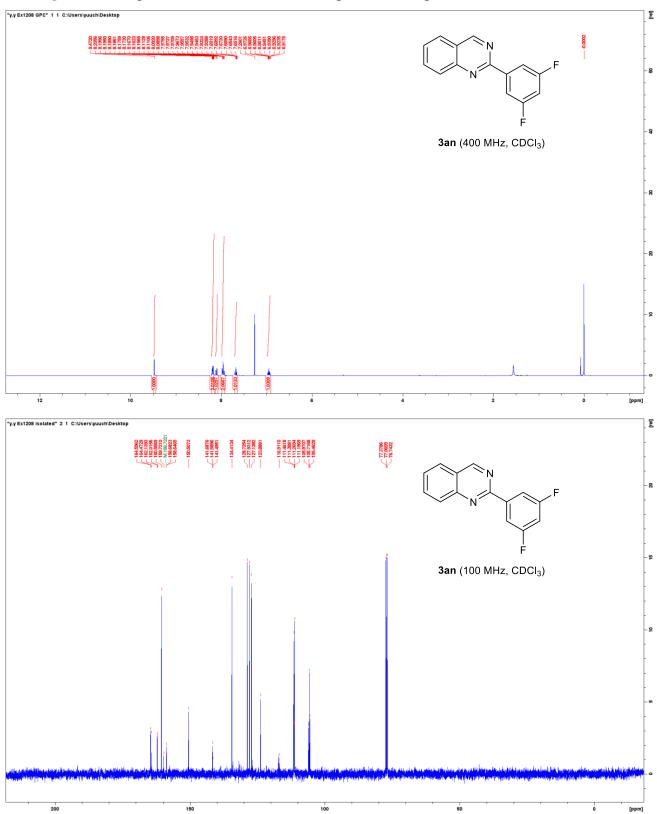


Figure S15: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3ao

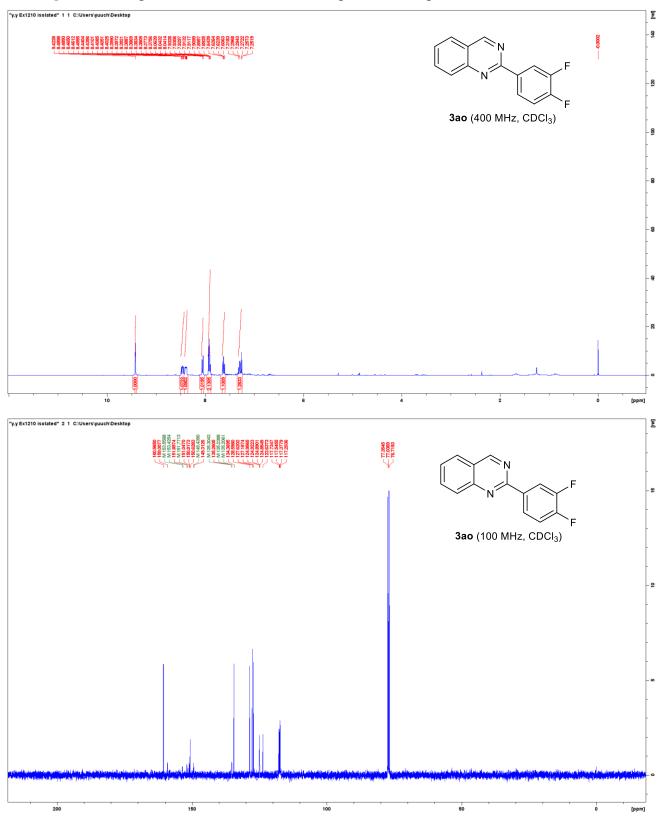


Figure S16: Copies of ¹H and ¹³C{¹H} NMR spectra of compound **3ap**

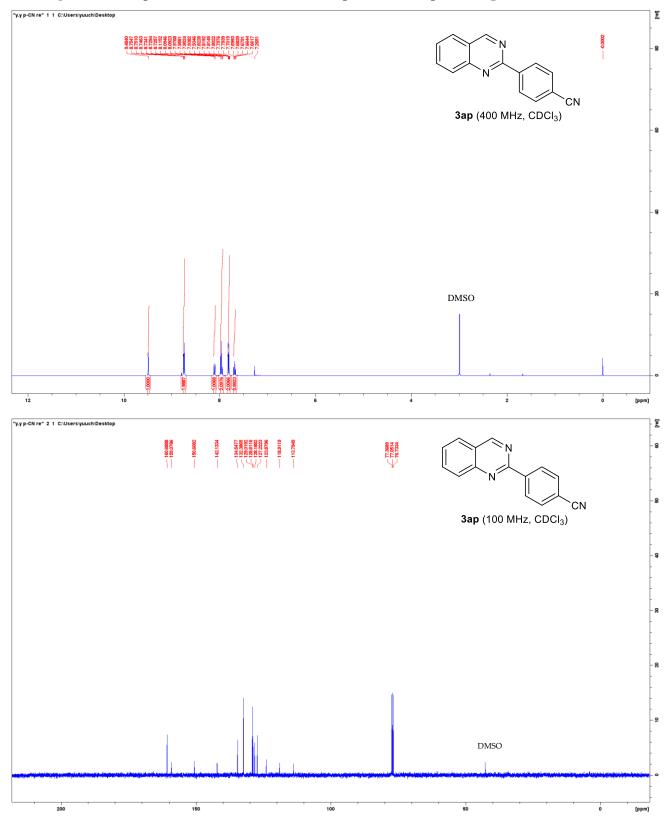


Figure S17: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3aq

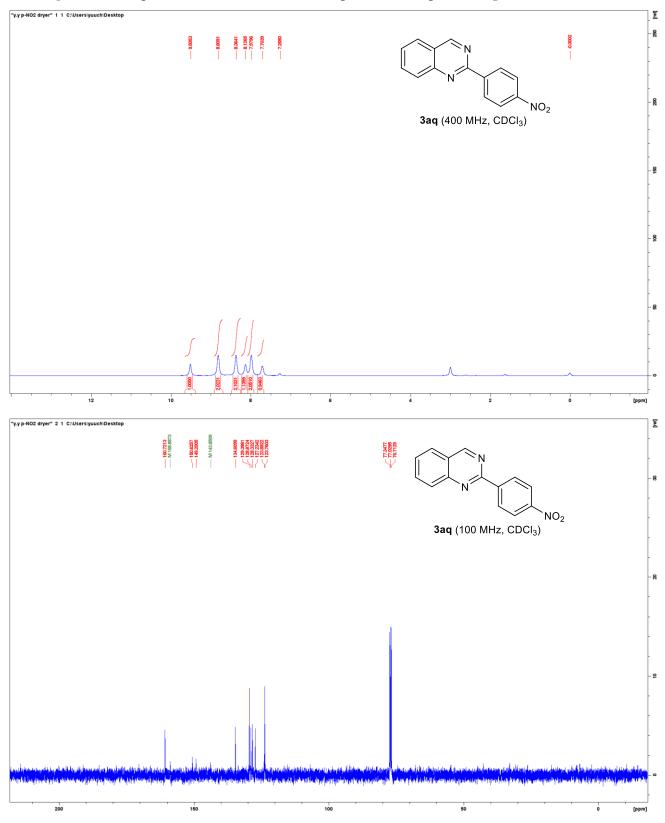
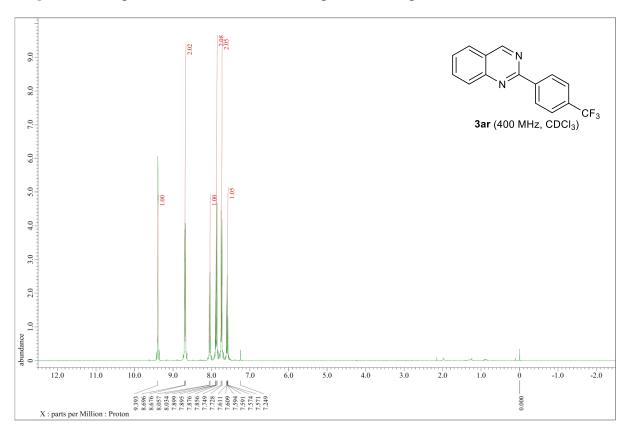


Figure S18: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3ar



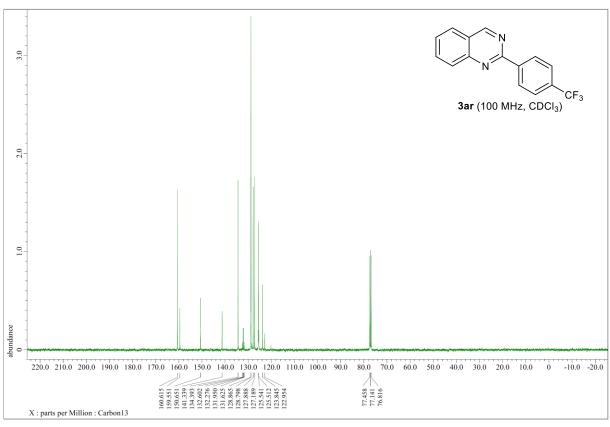
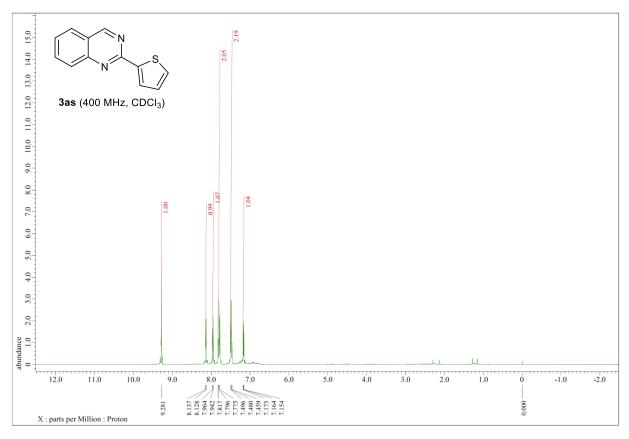


Figure S19: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3as



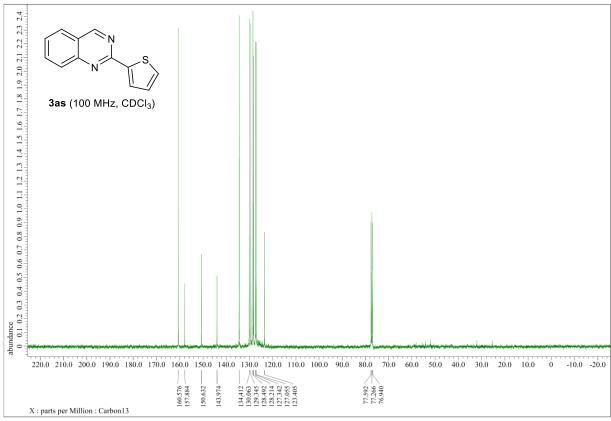


Figure S20: Copies of ${}^{1}H$ and ${}^{13}C\{{}^{1}H\}$ NMR spectra of compound 3at

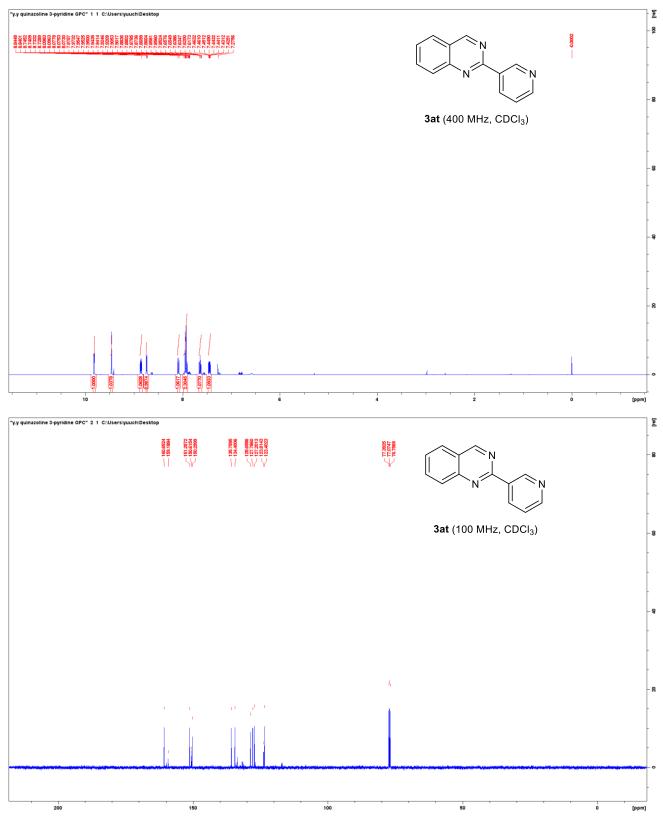
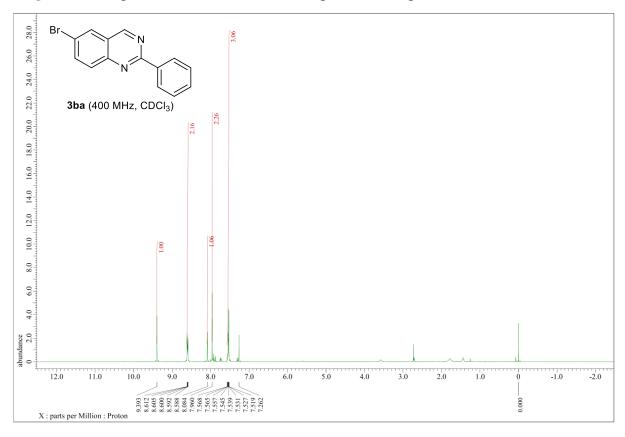


Figure S21: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 3ba



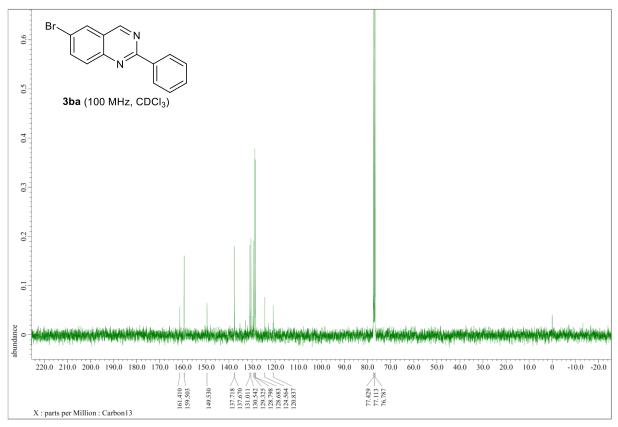
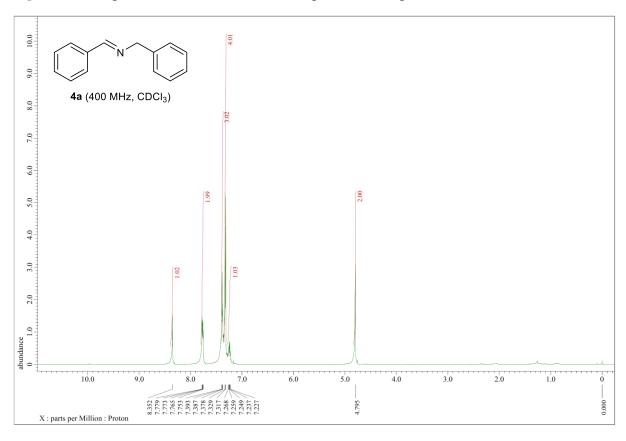


Figure S22: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 4a



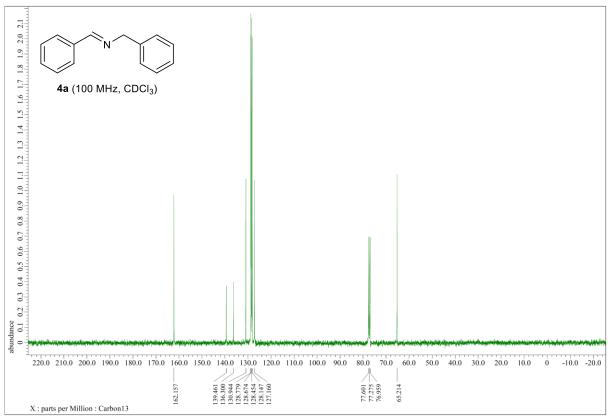
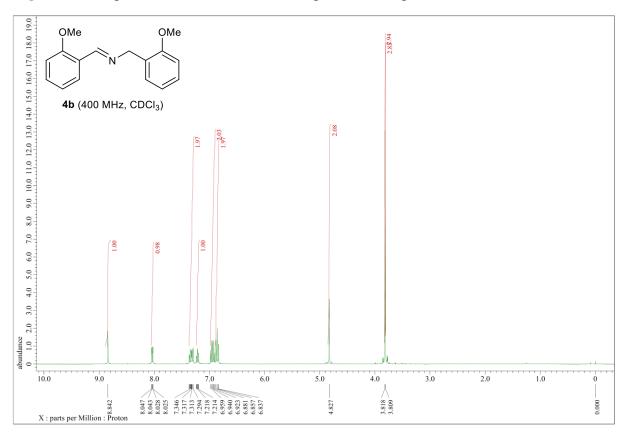


Figure S23: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 4b



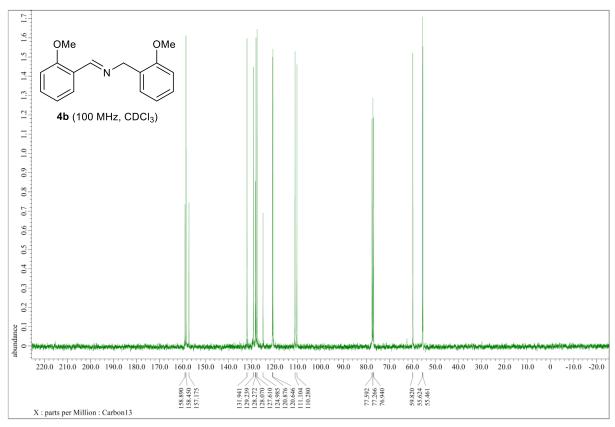
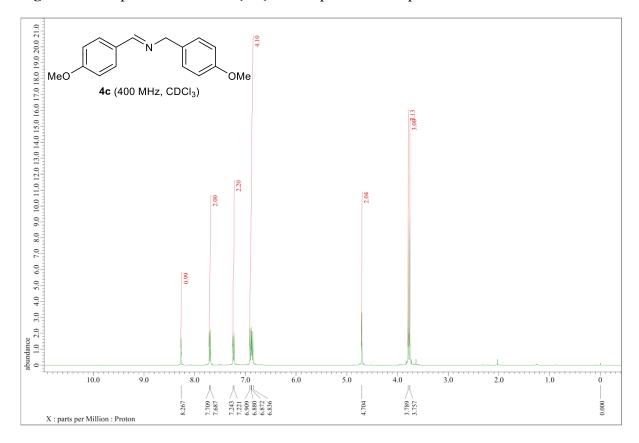


Figure S24: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 4c



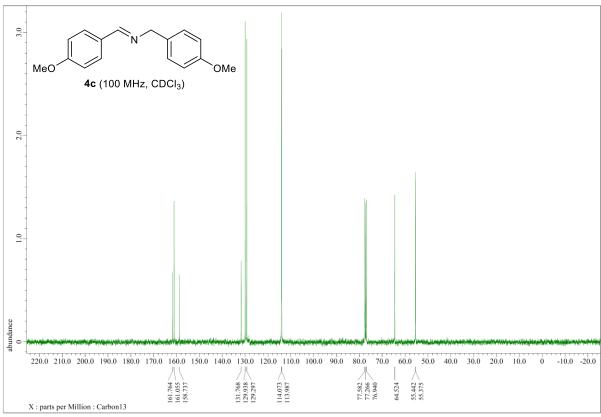
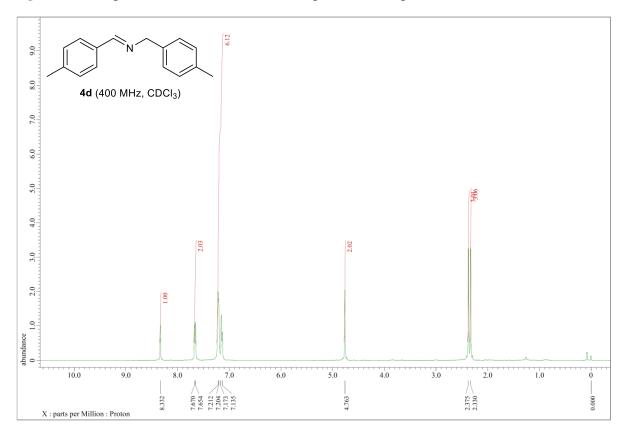


Figure S25: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 4d



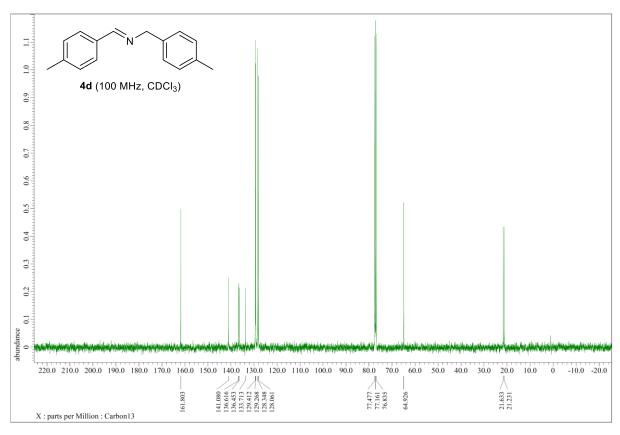


Figure S26: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 6a

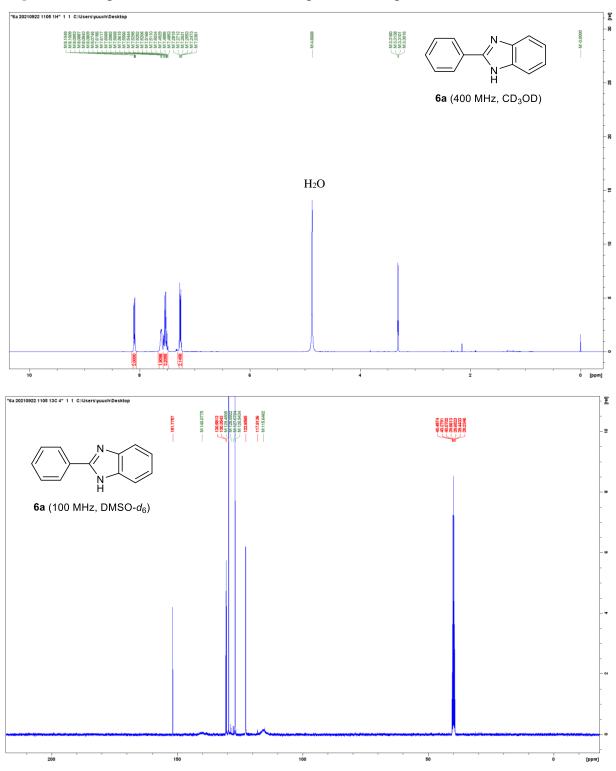


Figure S27: Copies of ¹H and ¹³C{¹H} NMR spectra of compound **6b**

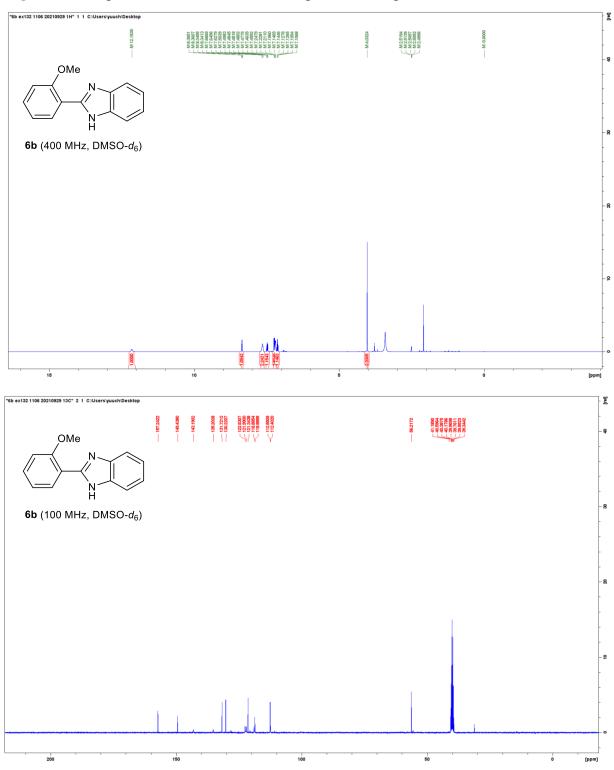
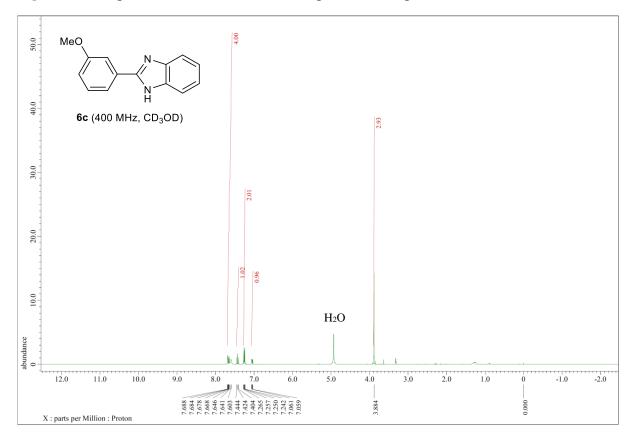


Figure S28: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 6c



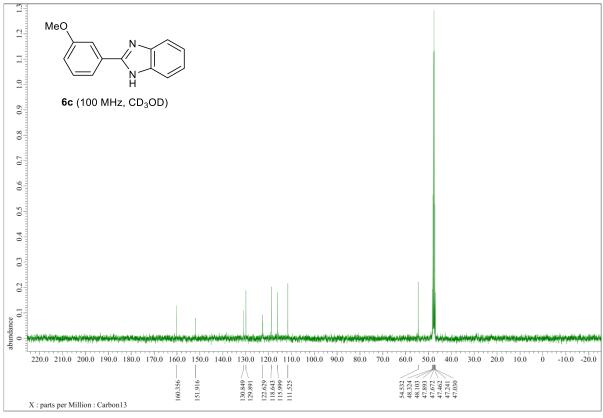
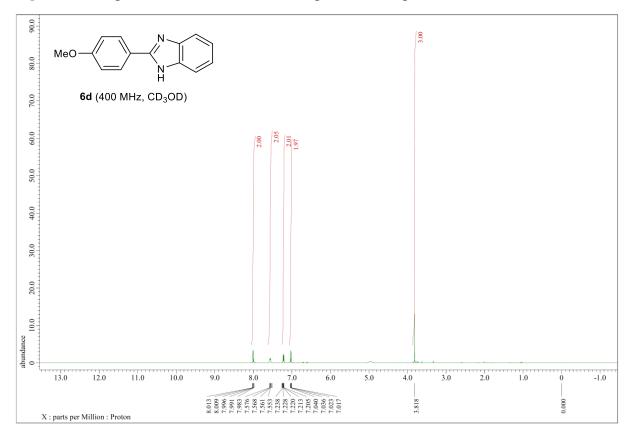


Figure S29: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 6d



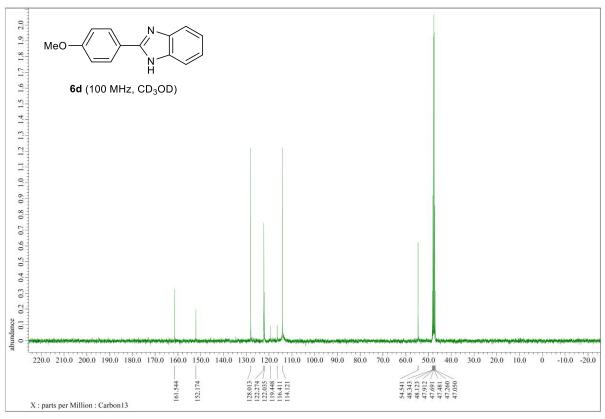
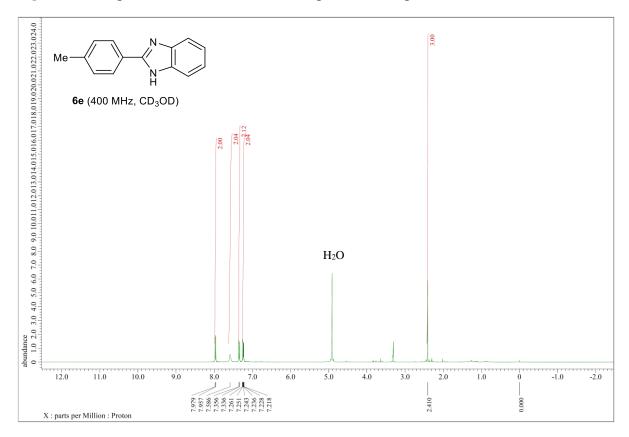


Figure S30: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 6e



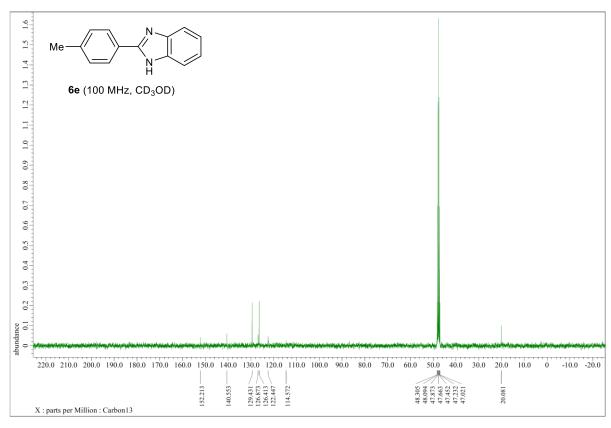
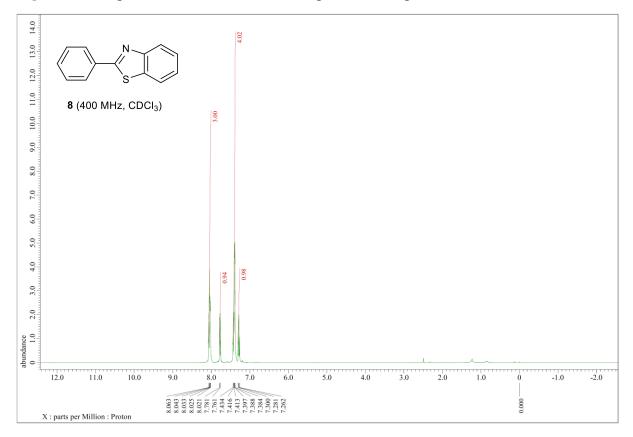


Figure S31: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 8



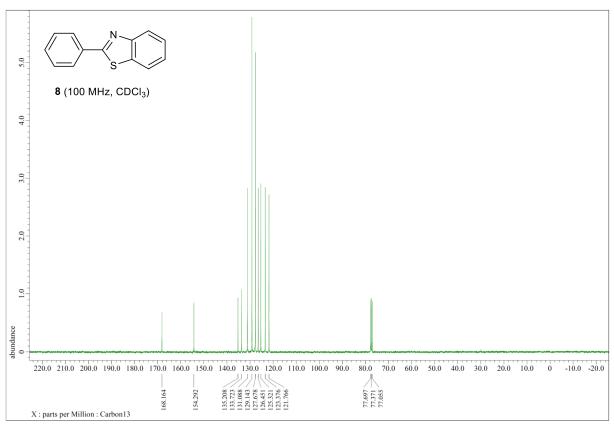


Figure S32: Copies of ¹H and ¹³C{¹H} NMR spectra of compound 9

