

Unequivocal Potentiometric Assignment of the Site of Adenosine Deprotonation in Aqueous Base

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Summary Potentiometric titrations on appropriate model compounds unequivocally prove that the adenosine ribose is deprotonated near pH 12.

EARLIER studies employing optical rotation¹ and calorimetric² titrations on adenosine and some related molecules suggested that a ribose hydroxy group (probably 2'-OH) deprotonates with a pK_a of 12.35.²

In order to interpret some recent experiments on adenosine³ we began to question whether the 6-amino group or the ribosyl OH is the site of deprotonation under basic conditions. Neither of the earlier results^{1,2} ruled out the former possibility.

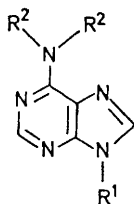
We have titrated potentiometrically compounds (I)—(IV) (see Table) and glucose (V), the latter as a control of our method. (Titrations were performed at 30.0 using a Radiometer model pHM 26 with type B glass electrode, employing 0.1M KCl as supporting electrolyte and nearly 0.5N KOH

TABLE

Molecule	R ¹	R ²	Conc (M)	pK^a	pK_{lit}
(I)	Ribose	H	0.005—0.01	12.12	12.35 ^c
(II)	Deoxyribose	H	0.01	not obs. ^b	—
(III)	Ribose	Me	0.005	12.21	—
(IV)	Me	H	0.005	not obs. ^b	—
Glucose	—	—	0.005—0.01	12.22	12.46 ^c

^a Our work at 30.0 °C. ^b Indistinguishable from the blank within our range of pH values. ^c From ref. 2 (25°).

as titrant. Due care was exercised to exclude CO_2 and O_2 during the titration).



The Table presents the results and comparison with available literature data. The data from the titrations were analysed using standard equations.⁴

As comparison with literature indicates our method gives results reproducing known values with as small as 0.005M substrate concentration.

From the results in the Table we can unequivocally assign the 12.35 p*K_a* of adenosine to the ribose.

(Received, 30th April 1973; Com. 617.)

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³ M. Maeda, M. Saneyoshi, and Y. Kawazoe, *Chem. Pharm. Bull. Japan*, 1971, **19**, 1641 and unpublished from this laboratory.

⁴ A. Banerjee and A. K. Dey, *J. Inorg. Nuclear Chem.*, 1968, **30**, 995.