treatments only a slight amount of unsaturation could be detected by use of tetranitromethane. Silica gel[4] was used to remove this unsaturated material.

After passing the olefins twice over the chromite catalyst at 270°, the products were allowed to percolate through silica gel packed in a vertical tube of approximately 20 mm. diameter. One and one-half grams of gel was employed for each gram of hydrogenation product. The effluent was collected in 5-ml. portions, and each portion tested for unsaturation. By repeated treatment it was possible to obtain products which give no color with tetranitromethane. (I) and (II) thus freed of olefins were dried by refluxing them over sodium, and were then distilled from the sodium.

PROPERTIES AND ANALYSES

		I	II
Calcd. for $C_{10}H_{22}$	C, 84.39 Found	84.24 84.35	84.40 84.22
	H, 15.61 Found	15.58 15.60	15.62 15.64
$n^{25}D$		1.4202	1.4208
d^{25}		0.7511	0.7516
MR (calcd., 48.13)		47.90	47.97
B. p. (763 mm.), °C.		156.6	159.2

The absorption spectra of these substances in the near infrared is discussed in a recent publication.[5]

(4) B. J. Mair and J. D. White, *Bur. Standards J. Research*, **15**, 51 (1935), have shown that silica gel effectively removes olefins from paraffins and naphthenes.

(5) F. W. Rose, Jr., *ibid.*, **19**, 143 (1937), R. P. 1017.

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A Study on the Parachor of Hexamethylenetetramine (Urotropine)

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The method of Hammick and Andrew[1] for finding the parachor of a solute in a solution is particularly valuable for some substances (like urotropine) whose direct investigation in the fused state is not possible. However, these authors reported that, using water as solvent, anomalous results were obtained for the parachors of the solutes, though they gave neither examples nor data. On the other hand, Ray[2] determined the parachors of sugars in aqueous solutions and obtained normal results. Since water is the most important solvent, we have investigated the parachor of hexamethylenetetramine in aqueous solutions, and found it also to be normal.

"Urotropine," (U. S. P., 30 mesh, Heyden Chemical Corporation), was purified by recrystalling it twice from warm absolute alcohol according to Butlerow.[3] Its different concentrations in conductivity water were made up accurately. The surface tensions, γ, were measured at four different temperatures, 20, 25, 35, and 45°, by the method of capillary rise using first a cathetometer graduated to 0.05 mm. and later one graduated to 0.01 mm. The capillary, made from the stem of a broken thermometer, was calibrated against pure water and benzene at 25°, and found to have a radius of 0.1729 cm. The thermostat used was of the toluene–mercury type keeping the temperature constant within 0.1°. The density, D, of the solution at definite temperature was determined by the regular pycnometer method, correction being made for the buoyancy of the air. The parachor of the solution, P_m, and that of hexamethylenetetramine, P, were calculated according to the equations

$$P_m = M_m\gamma^{1/4}/D$$
$$M_m = (1 - x)M_0 + xM$$
$$P_m = (1 - x)P_0 + xP$$

in which M_0 and P_0 are the molecular weight and the parachor of water and M and x the molecular weight and the mole fraction of hexamethylenetetramine. The values of P_0 were calculated from the surface tensions of water, which are 72.75, 71.97, 70.38, and 68.74 dynes/cm. at 20, 25, 35, and 45°, respectively.[4] The results are summarized in the table.

PARACHOR OF HEXAMETHYLENETETRAMINE

t, °C.	x	D	γ	P_0	P_m	P	Av. P
20	0.02926	1.0422	72.19	52.67	60.38	316.1	315.5
	.03351	1.0482	72.11	52.67	61.46	314.8	
25	.02601	1.0353	71.22	52.64	59.48	315.4	314.8
	.04233	1.0557	70.77	52.64	63.71	314.2	
35	.008174	1.0070	70.07	52.51	54.64	313.1	314.9
	.02142	1.0261	69.98	52.51	58.17	316.7	
45	.01381	1.0115	68.40	52.40	56.04	315.6	315.4
	.02964	1.0324	67.97	52.40	60.19	315.1	

The average parachor of hexamethylenetetramine for four temperatures is 315.2. Evidently the result is normal though water is used as a solvent in the solution method.

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(1) Hammick and Andrew, *J. Chem. Soc.*, 754 (1929).

(2) Ray, *J. Indian Chem. Soc.*, **11**, 843 (1934).

(3) Butlerow, *Ann. Chem. Pharm.*, **115**, 322 (1860).

(4) "International Critical Tables," Vol. IV, 1927, p. 447.