soil, irrigation, fertilizers, etc., should also be investigated. It is also conceivable that proper glass filters might retain a significant part of the inhaled polonium, as indicated by Radford and Hunt[2] and by our preliminary measurement.

Other polonium-absorbing materials such as silver or nickel should also be considered. In any event, we strongly believe that α-spectroscopy, which utilizes apparatus similar to that described here, can be a powerful tool in the investigation of all these questions. It could also help in the investigation of radioactivity of polluted air from factory smoke and automobile fumes. Such an experimental system is practically free from background. It permits determination and identification of minute quantities of α-active isotopes. Counting efficiency of up to 100 per cent, and with no appreciable loss in energy resolution, can be achieved with the use of 2 solid-state detectors connected in parallel in a 4π arrangement, and sources plated on very thin foils. In short, a spectroscopic system is unambiguous and fast, and is therefore preferable to systems which utilize analysis by half-life.

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Synthesis of Substituted Phenyl-β-D-xylopyranosides

Investigations into the specificity of a β-xylosidase required the synthesis of a number of substituted phenyl-β-D-xylosides. A very important method is the Helferich reaction in which the appropriate phenol and the fully acetylated monosaccharide are heated in the presence of an acidic catalyst. To favour the formation of xyloside-acetates with the β-anomeric configuration, *p*-toluenesulphonic acid and β-tetra-*O*-acetyl-xylose were used[1].

The corresponding xylosides were prepared by catalytic deacetylation of the acetates.

Tetra-*O*-acetyl-β-D-xylose was prepared according to Vogel[2] and twice crystallized from ethanol : m.p. 127°–128°.

The xylosetetraacetate (31·8 g; 0·1 mol.) and the appropriate phenol (0·4 mol.) were fused together and the molten mixture treated with a solution of *p*-toluenesulphonic acid (0·6 g) in a mixture of acetic acid and acetic anhydride (95 : 5; 50 ml.). The mixture was heated under reduced pressure at 100° for 1 h. After cooling, the resulting syrup was dissolved in chloroform (200 ml.), thoroughly washed with ice-cold N sodium hydroxide and water, dried (Na_2SO_4) and evaporated *in vacuo*. The resulting syrup was then crystallized from the appropriate solvent to constant m.p. and optical rotation.

The *ortho*-substituted phenol, *o*-chlorophenol, failed to react in the presence of *p*-toluenesulphonic acid even at higher temperature. Jermyn[3] likewise reports inability to obtain *o*-chlorophenyl-tri-*O*-acetyl-β-D-glucoside by this method. However, we succeeded in obtaining the *o*-chloroderivative by a modified Michael synthesis[4]. To a solution of *o*-chlorophenol (8·95 g; 0·07 mol.) in acetone (192 ml.), potassium hydroxide (3·36 g) in methanol (50 ml.) and acetobromoxylose (20 g; 0·059 mol.) were added. After 5 h at room temperature the mixture was filtered and evaporated *in vacuo*. The residue was dissolved in chloroform (100 ml.), washed with ice-cold 5 per cent sodium carbonate and water, dried (Na_2SO_4), evaporated *in vacuo* and crystallized from ethanol.

Table 1. Acetylated β-D-Xylopyranosides

	M.p. cryst. solvent	$(\alpha)_D^{25}$	Yield		Analytical value C	H	Cl
p-cresyl $C_{18}H_{22}O_8$	114° Methanol	−45·1° *c*, 4	48	*f*	59·0	6·1	—
				c	59·0	6·0	—
m-cresyl	112° Methanol	−48·2° *c*, 4	37	*f*	58·8	6·1	—
o-cresyl	112°–113° Methanol	−53·6° *c*, 2	32	*f*	58·7	6·1	—
p-chloro-*m*-cresyl $C_{18}H_{21}O_8Cl$	134°–135° Ethanol	−45·0° *c*, 2	32	*f*	—	—	8·8
				c	—	—	8·9
p-chlorophenyl $C_{17}H_{19}O_8Cl$	129°–130° Ethanol	−48·6° *c*, 2	54	*f*	—	—	9·2
				c	—	—	9·2
m-chlorophenyl	108°–109° Ethanol	−52·2° *c*, 2	47	*f*	—	—	9·2
o-chlorophenyl	130°–132° Ethanol	−75·5° *c*, 2	30	*f*	—	—	9·2

f, found. *c*, calculated

Table 2. β-Xylopyranosides

	M.p. cryst. solvent	$(\alpha)_D$	Yield		Analytical value C	H	Cl
p-cresyl $C_{12}H_{16}O_5$	162°–163° Methanol	−42·0° *c*, 4	89	*f*	60·0	6·7	—
				c	60·0	6·7	—
m-cresyl	145°–146° Methylethyl-ceton	−45·0° *c*, 2	93	*f*	59·8	6·7	—
o-cresyl	163° Methylethyl-ceton	−48·0° *c*, 2	95	*f*	59·5	6·7	—
p-chloro-*m*-cresyl $C_{13}H_{15}O_5Cl$	178° Ethylacetate	−39·5° *c*, 2	79	*f*	—	—	13·0
				c	—	—	12·9
p-chlorophenyl $C_{11}H_{13}O_5Cl$	156°–157° Ethylacetate	−41·6° *c*, 2	72	*f*	—	—	13·6
				c	—	—	13·6
m-chlorophenyl	149°–150° Water	−47·8° *c*, 2	81	*f*	—	—	13·7
o-chlorophenyl	175°–176° Water	−57·0° *c*, 2	80	*f*	—	—	13·6

The tri-*O*-acetyl-β-D-xylopyranosides shown in Table 1 were prepared in this way (all rotations were determined for chloroform solutions).

Preparation of substituted phenyl-β-D-xylopyranosides[5]. 1 g of the corresponding acetate, dissolved or suspended in 10-ml. dry methanol, was treated with 3 ml. of a freshly prepared solution of sodium methoxide (0·5 g of sodium in 100 ml. of methanol). After standing a few hours at room temperature the sodium was removed with a slight excess of 'Dowex 50 *W*' (H^+). The solution was filtered, evaporated *in vacuo* and crystallized from a suitable solvent. Table 2 shows the β-D-xylosides prepared (all rotations were determined for methanol solutions).

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Analysis of the Absorption Spectrum of Solutions of Uranyl Compounds

The absorption spectra of solutions of uranyl compounds between 20,000 and 28,000 cm^{-1} show some features which have, at least to our knowledge, not been stressed in the literature.

Indeed, if $\Delta\nu$ is plotted against decreasing values of ν the results shown in Fig. 1 are obtained; $\Delta\nu$ being the