Bismuth Isotopes

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The magneto-optic method shows that bismuth has fourteen isotopes.

A STUDY of three different compounds of bismuth by the magneto-optic method,[1] employing the same technique as in the study of lead isotopes,[2] shows fourteen minima for each which indicates that bismuth has fourteen isotopes. The data are shown in Table I.

The probable masses assigned are those required by the accompanying paper[3] and the direct variation of mass of isotopes with the time lag.[2]

TABLE I. *Scale readings and differential time lags with respect to carbon disulfide of bismuth isotopes in various compounds.*

Probable atomic mass of bismuth	Order of abundance	Chloride		Sulfate		Phosphate	
		Scale reading	Sec. $\times 10^9$	Scale reading	Sec. $\times 10^9$	Scale reading	Sec. $\times 10^9$
205	10	32.47	−17.47	25.18	−10.18	45.16	−30.16
206	11	32.37	−17.37	25.09	−10.09	44.96	−29.96
207	9	32.26	−17.26	25.00	−10.00	44.76	−29.76
208	12	32.17	−17.17	24.90	− 9.90	44.57	−29.57
209	3	32.08	−17.08	24.81	− 9.81	44.40	−29.40
210	2	32.01	−17.01	24.70	− 9.70	44.20	−29.20
211	1	31.90	−16.90	24.61	− 9.61	44.03	−29.03
212	4	31.82	−16.82	24.52	− 9.52	43.84	−28.84
213	7	31.72	−16.72	24.43	− 9.43	43.64	−28.64
214	6	31.63	−16.63	24.34	− 9.34	43.46	−28.46
215	5	31.54	−16.54	24.26	− 9.26	43.27	−28.27
216	8	31.44	−16.44	24.18	− 9.18	43.08	−28.08
217	14	31.36	−16.36	24.08	− 9.08	42.88	−27.88
219	13	31.26	−16.26	24.00	− 9.00	42.70	−27.70

The order of abundance was determined by both the dilution[2] and rotation of the nicol[2] method.

The bismuth solution used was tested for uranium which was found present in approximately one part in 10^8. This explains the presence of the heavy, short-lived isotopes.

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[1] Allison and Murphy, J. Am. Chem. Soc. **52**, 3796 (1930); Allison, Ind. Eng. Chem. (Anal. Ed.) **4**, 9 (1932).

[2] Bishop, Lawrenz and Dollins, *Lead Isotopes*, Phys. Rev. **43**, 43 (1933).

[3] Bishop, *Radioactive Families*, Phys. Rev. **43**, 38 (1933).