Economic estimation of a composition

A clinical scientist has been experimenting with different means of estimating a five-part composition [1, 2, 3, 4, 5] of blood plasma using aliquots drawn from the specimen. She has a number of methods for acquiring information about the composition. She can analyse an aliquot in four different ways:

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(1) determine the full [1, 2, 3, 4, 5] composition;
(2) determine the [1, 2, 3, 4] subcomposition
(3) determine the [1, 2, 3] subcomposition;
(4) determine the [1, 4, 5] subcomposition;
(5) determine the [1+2, 3+4,5] amalgamation.

The results of the analysis of 20 such aliquots are given below, with an obvious notation.

Aliquot	Nature of Determination	Proportions of parts 1	2	3	4	5
1	1 2 3 4 5	0.26	0.27	0.12	0.24	0.11
2	1 2 3 4 5	0.25	0.30	0.14	0.20	0.11
3	1 2 3 4 5	0.36	0.20	0.11	0.22	0.11
4	1 2 3 4 5	0.32	0.25	0.15	0.18	0.11
5	1 2 3 4 5	0.40	0.17	0.09	0.23	0.12
6	1 2 3 4 5	0.30	0.25	0.15	0.19	0.10
7	1 2 3 4 5	0.29	0.26	0.14	0.20	0.11
8	1 2 3 4 5	0.33	0.23	0.12	0.19	0.12
9	1 2 3 4 5	0.34	0.21	0.11	0.23	0.11
10	1 2 3 4 5	0.38	0.19	0.12	0.20	0.10
11	1 2 3 4 0	0.39	0.23	0.15	0.23	-100
12	1 2 3 0 0	0.35	0.48	0.17	-100	-100
13	1 2 3 0 0	0.47	0.35	0.18	-100	-100
14	1 2 3 0 0	0.38	0.42	0.20	-100	-100
15	1 2 3 0 0	0.51	0.31	0.19	-100	-100
16	1 2 3 0 0	0.40	0.39	0.21	-100	-100
17	1 0 0 4 5	0.58	-100	-100	0.26	0.16
18	1 0 0 4 5	0.45	-100	-100	0.37	0.17
19	1 0 0 4 5	0.39	-100	-100	0.39	0.21
20	1+2 3+4 5	0.58		0.31		0.11

You are asked to estimate the composition of the specimen using all of this irregular data. How would you provide information about the reliability of the estimate?

The clinical scientist now tells you that the costs of the various determinations 1 – 5 are 10, 5, 2, 4, 3 units, respectively and that she would like to keep the cost of estimating the composition of a specimen to a maximum of 120 units. How would you advise her and what is the likely reliability of the method you suggest?