

A challenge to describe dental amalgam compositional variability

There are currently difficulties involved in the manufacture of a revolutionary dental amalgam whose six-part composition [a, b, c, d, e, f] seems to be subject to substantial variability. A sample of 50 amalgam compositions has been produced and you are now asked to analyse this variability and to suggest where the production problem may lie. The compositions of the fifty amalgams are recorded below.

Amalgam	Percentages of parts a - f					
	a	b	c	d	e	f
1	12.1	8.4	21.9	9.3	8.5	39.8
2	4.6	9.1	20.8	14.9	13.9	36.6
3	8.4	9.7	20.4	7.5	6.4	47.6
4	6.0	7.4	20.5	6.0	26.1	34.0
5	13.3	6.6	14.5	9.7	8.1	47.8
6	2.3	4.3	14.2	27.9	29.1	22.3
7	6.0	5.1	20.3	21.1	6.8	40.6
8	2.9	7.0	19.0	7.3	9.1	54.7
9	4.1	6.3	16.5	16.1	13.5	43.5
10	6.1	6.8	20.0	21.0	7.8	38.3
11	3.8	6.3	23.5	13.5	8.1	44.8
12	9.2	5.8	17.7	17.8	5.2	44.3
13	1.3	8.2	20.9	21.2	2.2	46.2
14	17.2	5.9	26.0	3.6	9.4	38.0
15	4.4	5.7	18.7	18.9	10.7	41.5
16	7.7	6.1	17.3	23.8	10.7	34.4
17	6.7	8.3	20.2	24.3	6.7	33.8
18	4.9	7.5	30.7	4.3	2.4	50.2
19	5.7	7.5	20.3	22.5	4.6	39.4
20	6.0	5.0	14.6	20.2	12.1	42.1
21	1.7	6.2	16.4	17.9	10.2	47.5
22	3.2	5.6	19.8	25.9	9.5	36.0
23	4.3	7.5	16.3	28.8	4.7	38.4
24	4.8	6.7	18.1	18.9	19.7	31.8
25	4.8	3.7	14.4	32.5	5.4	39.2
26	12.2	5.7	19.5	21.4	6.1	35.1
27	6.0	9.3	26.9	3.9	7.1	46.8
28	5.0	6.0	25.5	10.2	6.4	46.9
29	11.1	5.9	16.3	14.6	11.1	41.0
30	12.4	7.2	22.5	3.8	5.5	48.6
31	11.2	8.3	23.8	9.5	4.0	43.2
32	4.8	5.1	15.1	11.8	20.2	43.0
33	4.7	6.9	18.8	19.8	5.7	44.1
34	9.4	5.2	15.2	23.5	7.8	38.8
35	2.1	6.5	28.7	12.9	4.1	45.8
36	17.0	6.4	25.0	15.6	2.1	34.0
37	5.6	7.8	27.7	8.0	3.5	47.3
38	2.3	7.5	22.0	8.1	8.0	52.1
39	8.6	6.4	20.9	18.5	5.7	39.8

40	4.3	5.3	21.3	21.1	3.3	44.7
41	4.0	9.3	20.5	13.7	2.8	49.6
42	2.5	9.2	22.3	4.5	20.4	41.2
43	9.5	7.4	23.0	12.2	3.1	44.8
44	1.7	6.5	19.9	7.8	12.8	51.3
45	8.4	6.8	18.2	19.8	4.2	42.5
46	2.0	7.6	23.8	6.8	9.2	50.6
47	4.4	6.9	22.0	24.2	4.5	38.0
48	5.1	5.9	21.8	6.7	2.9	57.5
49	16.5	8.5	17.1	7.7	10.9	39.2
50	3.1	6.9	18.5	25.7	4.5	41.2