

HEALTH AND SAFETY DATA SHEET

Rev 01 (MJW 05-NOV-02)

Product:	The Element Collection (full version)
Description:	A boxed set of sealed specimen tubes containing samples of the 92 naturally occurring elements from the periodic table.
Intended Use:	Educational display and teaching aid for the physical sciences.
Manufacturer:	The Red Green & Blue Company 1 Underwood Row London N1 7LZ England
Contact:	Max Whitby, Director +44 (0) 20 7490 1788 max@rgbco.com http://www.element-collection.com
Physical:	452 x 237 x 57 mm (main box) 42 x 20 mm (92 No. specimen tubes) 2.4 kg in total
Packaging:	Box made of felt-lined 3mm plywood in 10mm wooden frame with internal wooden dividers creating cells for each sample. Specimen tubes are borosilicate glass with black urea plastic tops. All specimen tubes are permanently sealed with high chemical and temperature resistant epoxy. Toxic samples (see below) are further protected inside a second inner borosilicate glass vessel with stopper. Reactive and radioactive samples (see below) are further protected by permanent embedding in an extremely tough, chemically resistant clear polyurethane resin matrix.
Contents:	See table attached for complete listing of materials with quantities, hazard assessment and description of individual risk control measures.
Risk Management:	Hazardous materials are permanently sealed and carefully packaged to minimise risk of accidental exposure (see table and photographs attached). Very small quantities (typically 0.1 g to 0.25 g) of the more sensitive materials are provided. Radioactive samples (in aggregate) fall considerably below relevant exemption thresholds under UK legislation.
References:	The Royal Society of Chemistry, Chemical Data Sheets ISBN 0-85186-913-0 (1989), 316-6 (1991), 411-2 (1992)

Atomic #	Symbol	Name	Amount	Form	Risk	Control Measures
1	H	Hydrogen	7 ml	gas	flammable, asphyxiant	very small volume; permanently sealed
2	He	Helium	7 ml	gas	asphyxiant	very small volume presents no hazard
3	Li	Lithium	0.25 g	metal granules	flammable	very small quantity; permanently sealed in double vessels
4	Be	Beryllium	0.05 g	metal foil	very toxic	safest form (massive metal) selected; permanently sealed in double vessels
5	B	Boron	1 g	amorphous powder	toxic	small quantity; permanently sealed
6	C	Carbon	2 g	lump		
7	N	Nitrogen	7 ml	gas	asphyxiant	very small volume presents no hazard
8	O	Oxygen	7 ml	gas	oxidant	very small volume presents no hazard
9	F	Fluorine	0.5 ml	gas	toxic, corrosive	ultra small quantity; permanently sealed in double vessels
10	Ne	Neon	7 ml	gas	asphyxiant	very small volume presents no hazard
11	Na	Sodium	0.25 g	metal sliver	flammable	very small quantity; under mineral oil; permanently sealed in double vessels
12	Mg	Magnesium	2 g	metal turnings	flammable	small quantity; permanently sealed
13	Al	Aluminium	0.5 g	metal foil		
14	Si	Silicon	2 g	irregular pieces		
15	P	Phosphorous	1 g	amorphous powder	toxic	safest allotrope selected; low toxicity; not flammable white form
16	S	Sulphur	2 g	powder		
17	Cl	Chlorine	7 ml	gas	toxic, corrosive	small quantity; permanently sealed
18	Ar	Argon	7 ml	gas	asphyxiant	very small volume presents no hazard
19	K	Potassium	0.25 g	metal sliver	flammable	very small quantity; under mineral oil; permanently sealed in double vessels
20	Ca	Calcium	1 g	turnings	flammable	small quantity; permanently sealed
21	Sc	Scandium	0.25 g	irregular metal pieces	flammable	very small quantity; permanently sealed
22	Ti	Titanium	0.25 g	metal foil		
23	V	Vanadium	0.5 g	irregular metal pieces		
24	Cr	Chromium	1 g	irregular metal pieces	toxic	small quantity; permanently sealed
25	Mn	Managanese	2 g	irregular metal pieces		
26	Fe	Iron	2 g	irregular metal pieces		
27	Co	Cobalt	2 g	irregular metal pieces	sensitising	small quantity; permanently sealed
28	Ni	Nickel	1 g	metal foil		
29	Cu	Copper	2 g	metal turnings		
30	Zn	Zinc	2 g	irregular metal pieces		
31	Ga	Gallium	0.5 g	irregular metal pieces		
32	Ge	Germanium	0.25 g	irregular metal pieces		
33	As	Arsenic	0.25 g	irregular metal pieces	toxic	very small quantity; permanently sealed in double vessels
34	Se	Selenium	0.5 g	irregular metal pieces		
35	Br	Bromine	0.1 g	liquid	very toxic, corrosive	very small quantity; permanently sealed in double vessels; embedded in resin
36	Kr	Krypton	7 ml	gas	asphyxiant	very small volume presents no hazard
37	Rb	Rubidium	0.1 g	metal sliver	highly flammable	very small quantity; permanently sealed in double vessels; embedded in resin
38	Sr	Strontium	1 g	irregular metal pieces	flammable	small quantity; permanently sealed; under mineral oil
39	Y	Yttrium	0.25 g	irregular metal pieces		
40	Zr	Zirconium	0.25 g	metal foil		
41	Nb	Niobium	0.5 g	irregular metal pieces		
42	Mo	Molybdenum	0.5 g	metal foil		
43	Tc	Technetium	0.25 g	natural mineral specimen	radioactive	very low level (< 0.5 mRem/h); permanently sealed in double vessels; embedded in resin
44	Ru	Ruthenium	0.25 g	irregular metal pieces		
45	Rh	Rhodium	0.25 g	irregular metal pieces		
46	Pd	Palladium	0.25 g	metal foil		
47	Ag	Silver	0.5 g	metal foil		

Atomic #	Symbol	Name	Amount	Form	Risk	Control Measures
48	Cd	Cadmium	2 g	irregular metal pieces	toxic	small quantity; not particulate; permanently sealed
49	In	Indium	1 g	irregular metal pieces		
50	Sn	Tin	0.5 g	metal foil		
51	Sb	Antimony	0.25 g	irregular metal pieces	toxic	small quantity; permanently sealed
52	Te	Tellurium	0.25 g	irregular metal pieces	harmful	small quantity; permanently sealed
53	I	Iodine	1 g	irregular pieces	harmful	small quantity; permanently sealed
54	Xe	Xenon	7 ml	gas	asphyxiant	very small volume presents no hazard
55	Cs	Caesium	0.1 g	metal sliver	highly flammable	very small quantity; permanently sealed in double vessels; embedded in resin
56	Ba	Barium	0.25 g	irregular metal pieces	irritant	very small quantity; permanently sealed; under mineral oil
57	La	Lanthanum	0.5 g	irregular metal pieces	flammable	very small quantity; permanently sealed; under mineral oil
58	Ce	Cerium	0.5 g	irregular metal pieces	cerium	very small quantity; permanently sealed; under mineral oil
59	Pr	Praesodymium	0.5 g	irregular metal pieces		
60	Nd	Neodymium	0.5 g	irregular metal pieces		very small quantity; permanently sealed; under mineral oil
61	Pm	Promethium	< 0.01 g	spot of luminous paint	radioactive	very low level (< 0.5 mRem/h); permanently sealed in double vessels; embedded in resin
62	Sm	Samarium	0.5 g	irregular metal pieces	flammable	small quantity; permanently sealed
63	Eu	Europium	0.25 g	irregular metal pieces	flammable	very small quantity; permanently sealed; under mineral oil
64	Gd	Gadolinium	0.5 g	irregular metal pieces	flammable	small quantity; permanently sealed
65	Tb	Terbium	0.5 g	irregular metal pieces	flammable	small quantity; permanently sealed
66	Dy	Dysprosium	0.5 g	irregular metal pieces	flammable	small quantity; permanently sealed
67	Ho	Holmium	0.5 g	irregular metal pieces		
68	Er	Erbium	0.5 g	irregular metal pieces	flammable	small quantity; permanently sealed
69	Tm	Thulium	0.5 g	irregular metal pieces	flammable	small quantity; permanently sealed
70	Yb	Ytterbium	0.5 g	irregular metal pieces	flammable	small quantity; permanently sealed
71	Lu	Lutetium	0.25 g	irregular metal pieces	flammable	very small quantity; permanently sealed; under mineral oil
72	Hf	Halfnium	0.5 g	irregular metal pieces		
73	Ta	Tantalum	0.25 g	metal foil		
74	W	Tungsten	10 g	irregular metal pieces		
75	Re	Rhenium	0.25 g	irregular metal pieces		
76	Os	Osmium	0.25 g	irregular metal pieces	toxic	very small quantity; not finely divided; permanently sealed
77	Ir	Iridium	0.25 g	irregular metal pieces		
78	Pt	Platinum	0.25 g	metal foil		
79	Au	Gold	0.25 g	metal foil		
80	Hg	Mercury	5 g	liquid	toxic	small quantity; permanently sealed in double vessels
81	Tl	Thallium	0.25 g	metal sliver	toxic	very small quantity; permanently sealed in double vessels
82	Pb	Lead	5 g	thick metal foil	toxic	small quantity; permanently sealed
83	Bi	Bismuth	1 g	irregular metal pieces		
84	Po	Polonium	0.25 g	natural mineral specimen	radioactive	very low level (< 0.5 mRem/h); permanently sealed in double vessels; embedded in resin
85	At	Astatine	0.25 g	natural mineral specimen	radioactive	very low level (< 0.5 mRem/h); permanently sealed in double vessels; embedded in resin
86	Rn	Radon	0.25 g	natural mineral specimen	radioactive	very low level (< 0.5 mRem/h); permanently sealed in double vessels; embedded in resin
87	Fr	Francium	0.25 g	natural mineral specimen	radioactive	very low level (< 0.5 mRem/h); permanently sealed in double vessels; embedded in resin
88	Ra	Radium	< 0.01 g	spot of luminous paint	radioactive	very low level (< 0.5 mRem/h); permanently sealed in double vessels; embedded in resin
89	Ac	Actinium	0.25 g	natural mineral specimen	radioactive	very low level (< 0.5 mRem/h); permanently sealed in double vessels; embedded in resin
90	Th	Thorium	0.10g	metal wire	radioactive (< 300 Bq)	very low level (< 0.5 mRem/h); permanently sealed in double vessels; embedded in resin
91	Pa	Protactinium	0.25 g	natural mineral specimen	radioactive	very low level (< 0.5 mRem/h); permanently sealed in double vessels; embedded in resin
92	U	Uranium	0.05g	metal wire	radioactive (< 400 Bq)	very low level (< 0.5 mRem/h); permanently sealed in double vessels; embedded in resin



Black urea plastic screw top permanently bonded onto specimen tube with high strength chemically resistant epoxy cement

Borosilicate glass specimen tube

High strength resin (optically clear polyurethane) fills whole of tube and fully embeds inner vessel

Inner vessel (borosilicate glass with neoprene stopper embedded in epoxy) fully embedded in polyurethane resin

Sample of uranium wire under argon atmosphere (activity is < 0.5 mRem/h and radioactive content is < 300 Bq while the exemption threshold is 10,000 Bq)



Be close up of sample.JPG



62 Sm 02.JPG



Element Collection cl#74FBA.JPG



Br close up of sample.JPG



Cs close up of sample.JPG



Uranium close up.JPG



Uranium specimen tube.JPG



88 Ra 01.JPG



F close up of sample.jpg



resin block close up.JPG



resin block side view.JPG



Cs specimen tube.JPG



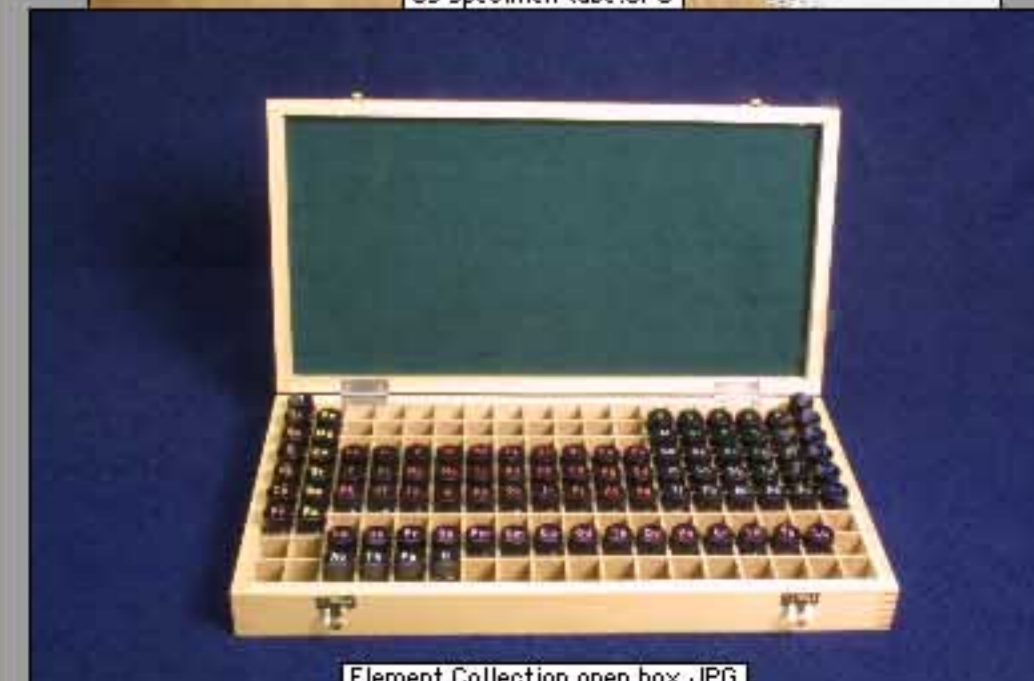
80 Hg 01.JPG



Br specimen tube.JPG



resin block.JPG



Element Collection open box.JPG