Reference List of Furniture and Equipment for Secondary School

Subject : NSS Chemistry

Item No.	Item	Description	Quantity
	EQUIPMENT		
1	Absorption tube [@]	(a) Straight, 145 x 17 mm.	2
		(b) U-form with side tube.	2
2	Aspirator bottle	With stopcock and plastic screw cap, polyethene.	
		(a) 5 L	4
		(b) 10 L	2
		(c) 20 L	2
3	Atomic model	(a) Skeletal	
		Comprises plastic spheres and flexible connectors representing atoms and bonds respectively. The spheres are in a variety of colours, and are number and/or letter coded for easy identification. There should be at least the following numbers and types of spheres (representing atoms of different elements, with oxidation states indicated in parentheses) for building a wide range of open type models: 14 metal(I, II, III, IV, VI), 8 halogen(I), 22 oxygen(I, II, IV), 13 sulphur(II, IV, VI), 10 nitrogen(III, V), 6 carbon(IV), 7 phosphorus(III, IV, V) and 14 hydrogen(I, II). The connectors should be of two different lengths (at least 50 medium and 36 long) for building the open structures. The set contains a storage box and an instruction booklet for building simple organic and inorganic	1 set

		structures.	
		(b) Lattice Set Contains 380 atom centres. With 8 to 12 coordinate atom centres to allow construction of complex models. Instructions cover construction of 7 crystal systems, diamond, graphite, metals, sodium chloride, zinc blend and wurtzite, 8 coordinated ionic structures, rutile, ice and layer structures.	1 set
4	Balance	Electronic, capacity 200 g. Taring range 100 g or above. For use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	
		(a) Readability 0.01 g, with USB or RS-232C data output terminal and connection cable	2
		(b) Readability 1 mg	1
		(c) Readability 0.1 mg	1
5	Barrier tape [@]	PVC tape, non-adhesive backing, for highlighting hazard/ restricted areas, 50 mm x 3 m.	2 rolls
6	Basin, evaporating [@]	Porcelain, shallow form with spout and glazed.	
		(a) 75 mL capacity, 80 x 30 mm. (diameter x depth)	24
		(b) 225 mL capacity, 110 x 45 mm. (diameter x depth)	12
7	Beaker [@]	Squat form, with spout, with two or more graduation marks showing approximate	

		capacities.	
		(a) Pyrex or equivalent, 50 mL	45
		(b) Pyrex or equivalent, 100 mL	90
		(c) Pyrex or equivalent, 250 mL	90
		(d) Pyrex or equivalent, 600 mL	12
		(e) Pyrex or equivalent, 1 L	3
		(f) Polypropene or equivalent, 250 mL ※	90
		(g) Polypropene, 2 L	4
8	Beehive shelf	Earthenware, glazed, 75mm diameter.	12
9	Bench mat #	Make of glass reinforced cement, asbestos free, about 300 x 300 mm, 4.5 mm thick.	12
10	Bottle, dropping	A three-piece pipette section comprising a stout glass dropper, high density polyethene stopper with dust-proof head and vinyl teat fitted to a bottle of	
		(a) Clear glass, 100 mL	60
		(b) Amber glass, 100 mL	60
11	Bottle, narrow mouth	With dust-proof stopper.	
		(a) Clear glass, 250 mL	30
		(b) Amber glass, 250 mL	90
		(c) Clear glass, 500 mL	20
		(d) Amber glass, 500 mL	15
12	Bottle, wide mouth	With dust-proof stopper.	
		(a) Clear glass, 250 mL	60
		(b) Amber glass, 250 mL	20
13	Bottle top dispenser ※	Bottle top and digital, with alternative adaptors for different bottle sizes, accuracy within 1%.	3
14	Brush	(a) For test tubes of diameter 10 to 12 mm. Nylon, diameter of head 15 mm.	12

		(b) For test tubes of diameter 16 to 25 mm. Nylon, diameter of head 30 mm.	12
		(c) For burette of capacity 50 mL. Nylon, diameter of head 19 mm, overall length 750mm.	12
15	Burette	With teflon stopcock, 50 mL in 0.1 mL graduations.	45
16	Burette clamp	Fitting retort stand rod up to 13 mm diameter.	45
17	Burner	(a) Bunsen For either town gas or liquefied petroleum gas depending on the type supplied. Nickel plated burner tube with rotatable air regulator and tapering, riffled connector, mounted on an enamelled pressed-steel base. Burner tube 100 x 13 mm (height x diameter), base 80 mm diameter, connector 10 mm mean outer diameter.	24
		(b) Teclu For either town gas or liquefied petroleum gas depending on the type supplied. Nickel-plated burner tube with a threaded disc valve for adjustment of air/gas mixture. Burner tube 105 x 13 mm (height x diameter), base 80 mm diameter, connector 10 mm mean outer diameter.	1
18	Chromatography column	Borosilicate glass for gravity elution, quickfit, 400 x 20 mm (length x diameter).	1
19	Clips	(a) Mohr, plated metal, accepts tubing of maximum diameter 15 mm.	12
		(b) Hoffman, plated metal, with clamp screw and hinged bottom plate, width between bars 20 mm.	12

		(c) Crocodile, small. [@]	60
		(d) Joint clip, made of PTFE, for retaining glassware having Quickfit conical joints with joint size 14/23. [※]	36
20	Cobalt glass	For flame test, 25 x 50mm.	12
21	Colorimeter	With seven or more colour filters for wavelength range 400-700 nm, filter holder and tube cover. Absorbance range 0-2. Digital or analog display. Data output 0-1 V. Accommodates 10 mm cuvettes or 16 mm test tubes. Battery operated or for use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	6
22	Combustion tube [@]	Borosilicate glass, open both ends, 300 x 20 mm (length x external diameter).	12
23	Cork [@]	Tapered, assorted sizes, pack of 144.	1 pack
24	Cork borer set	Borer, set of 6 from 4 to 10 mm. Plated metal. Cutting tube mounted with safety under-flange in shaped handle ensuring that operator cannot be injured by a dislodged tube. With rod for clearing borers. Sharpener, plated metal cone with hinged cutter blade set in slot and metal handle. Circular shape of borer maintained by cone. Edge cut to correct angle by depressing blade using thumb pressure button and rotating borer.	1 set
25	Crucible [@]	Porcelain, squat form, glazed inside and outside, unglazed base, with lid, 43 x 23 mm (diameter x depth).	24

26	Cylinder, graduated	With spout.	
		(a) Glass or plastic, 10 mL	12
		(b) Glass or plastic, 25 mL	12
		(c) Glass or plastic, 50 mL	12
		(d) Glass or plastic, 100 mL	24
		(e) Glass or plastic, 500 mL	2
		(f) Glass or platic, 1 L	1
		(g) Polypropene, 3 L (graduated pitcher)	1
27	Data logger interface	Hardware: The interface can log data from appropriate sensors by connecting to a Windows-compatible computer through a common communication port, such as serial port, parallel port and USB. It has also remote data logging capability without a computer. Provided with a combination of at least 3 analog and digital I/O channels. Analog and digital inputs can be recorded simultaneously. Sampling rates: 16kHz or above. Power supply: both battery operated and for mains voltage of 220- 240V, 50 Hz, single phase a.c. supplies; provided with d.c. adapter and connecting cables. Software: Runs on English/Chinese MS Windows 9x, NT, XP and Vista; displays and analyzes data in the forms of analog and digital meters, graphs, tables or oscilloscopes.	2 sets
28	Data logger sensors	The sensors should be fully compatible with the data logger interface.	
		(a) Colorimeter sensor: For measuring transmittance (30%-90%) of light (400-700 nm) through a solution, with cuvettes and caps.	2

		(b) Conductivity sensor: For measuring conductivity (0-20,000 mS/cm) in aqueous solutions.	2	
		(c) High temperature sensor: For measuring temperatures ranging from -200^{o}C to +1000^{o}C, with an accuracy of ±3^{o}C	2	
		(d) Temperature sensor: For measuring temperatures ranging from -35^{o}C to +135^{o}C, with an accuracy of ±0.5^{o}C.	2	
		(e) Light sensor: For measuring light intensity level, suitable for indoor and outdoor experiments with spectral response: 400-1000 nm.	2	
		(f) pH sensor: For measuring pH values ranging from 0-14 with an accuracy of ±2%.	2	
		(g) Pressure sensor: For measuring gas pressure ranging from 0 to 500 kPa.	2	
		(h) Voltage/Current sensor: For measuring a.c. and d.c. currents/voltage. Voltage range: ±10 volts. Current range: ±1 amp.	2	
29	Deioniser	(a) Wall mounting or bench standing. With battery operated water purity meter. For use with disposable mixed bed resin. Output: 100 to 1000 L of tap water depending on hardness. Flow rate: up to 100 L/hr. Effluent quality: conductivity 2mS/cm, residual solid <10.0 ppm, pH 6-7.	1	
		(b) Cartridge of mixed bed ion-exchange resin.	1	
30	Desiccator	Glass, with knob cover and perforated metal/porcelain disc, 210 mm top internal diameter, 190 mm disc diameter, 85 mm depth of disc below flange.	2	
31	Digital thermometer	Digital display, stainless steel probe, -50^{o}C	12	

		to 150°C x 0.1°C, battery operated, probe sheath.	
32	Electrode	(a) Carbon, 100 x 5 mm (length x diameter). [@]	48
		(b) Platinum foil, mounted in glass tube with 4 mm socket.	12
33	Electrode holder	Plastic holder about 80 x 20 x12 mm (length x width x height) with two crocodile clips for holding rod/foil electrodes.	12
34	Electrolysis cell	Comprises stout open ended glass tube, the lower end of which accommodates a tight-fitting rubber stopper fitted with two tapered carbon electrodes. Connection made by crocodile clips. Short-circuiting of electrodes is prevented by a strip of insulating material set into the rubber between the leads.	12
35	Eye wash unit	Equipped with an eye wash bottle. With dust cap for eye bath and side tube for draining of contaminated water. The bottle is clipped into a moulded panel on which simple but complete instructions are printed. The panel has holes for wall hanging.	1
36	Filter Paper [@]	(a) Whatman No.1, 7cm diameter.	2 packs
		(b) Whatman No.1, 12.5cm diameter.	5 packs
37	Flask, Buchner	Conical form with heavy wall for vacuum filtration, capacity 250 mL.	12
38	Flask, conical [@]	Narrow mouth, pyrex or equivalent.	
		(a) 100 mL	12
		(b) 250 mL	90

39	Flask, flat bottom [@]	Medium neck, pyrex or equivalent.	
		(a) 250 mL	2
		(b) 500 mL	2
40	Flask, volumetric	Graduated one mark, with inter-changeable plastic stopper, pyrex or equivalent.	
		(a) 100 mL[※]	45
		(b) 250 mL	45
		(c) 1 L	4
		(d) 2 L	1
		(e) 5 L	1
41	Forceps	Blunt ends, stainless steel, length 130 mm.	12
42	Funnel	(a) Buchner, porcelain, for filter paper of 70 mm diameter.	12
		(b) Dropping, cylindrical, open top, with interchangeable teflon stopcock, borosilicate glass, 100 mL.	3
		(c) Filter, plain, soda lime glass, 75 mm top diameter.[@]	45
		(d) Filter, plain, soda lime glass, 150 mm top diameter. [@]	3
		(e) Separating, conical shape, with interchangeable teflon stopcock and polypropene stopper, borosilicate glass, capacity 250 mL.	12
		(f) Thistle, with straight stem, soda lime glass, overall length 300 mm.	3
43	Gas jar, with cover	With base and ground top flange, glass, 50 x 150 mm (diameter x height) with circular glass cover, ground one side, 75 mm diameter.	24
44	Glass rod [@]	Soda lime glass, in length of about 1.5 m, 6 mm diameter.	1kg

45	Glass tubing [@]	Soda lime glass, in length of about 1.5 m, 8 mm external diameter. Pack of 25.	1 pack
46	Gloves	(a) Chemical resistant, for handling acids, alkalis and organic solvents, long cuff. Special finish for an excellent wet grip. [@]	2 pairs
		(b) Heat/Cold resistant, made of non-flammable non-asbestos material, with low thermal conductivity, high strength and high abrasion resistance, gives no dermatological problems. For furnace and hotplate work in the laboratory. Gauntlet length.	1 pair
		(c) Disposable nitrile gloves. Gives good resistance to abrasion, nicks and cuts and offers superior splash protection against irritating chemicals. 100 pieces a pack. [※]	1 pack
47	Hand protector [※]	Silicon rubber, capable of withstanding temperatures up to 250^{o}C.	12
48	Hazard warning labels [@]	Self-adhesive labels printed with various hazard symbols plus the appropriate hazard wording. Sheets of mixed symbols cover chemical hazards of toxic, harmful, corrosive, irritant, explosive, flammable and oxidising. Pack of about 100 for each symbol.	1 pack
49	Heating mantle [※]	For round bottomed flasks up to 250ml, maximum temperature 450 ^{o}C, fitted with earthed energy regulator screen, for use on 220 - 240 V.	2

50	Hoffman voltameter with stand	Two graduated limbs, each of 50 mL capacity, integral with reservoir tube and funnel-shaped bulb, with a stopcock at top of each limb, overall length approximately 650 mm, with interchangeable platinum and carbon electrodes mounted in rubber stoppers for insertion into the voltameter limbs. Supplied with stand.	1 set
51	Hydrogen fuel cell teaching kit	A solar cell module for conversion of radiant energy of light into electrical energy. A PEM electrolyser uses the electrical energy from the solar cell module to split water into hydrogen and oxygen gases, and stored in gas cylinders. A PEM fuel cell recombines the stored gases to produce water and electricity. Load measurement module for setting of various loads (resistances, lamp, motor) and display of voltage and current in the fuel cell circuit. User manual.	1
52	Labels	Plain, gummed, pack of 90.	5 packs
53	Low voltage power supply	Power supply, voltage continuously variable from 0-25 V, a.c. and d.c., maximum current (a.c. & d.c.) 8 A, with output voltage meter, thermal cutout, switch, fuse and pilot light. For use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	6
54	Magnetic stirrer-hotplate	1,300 r.p.m. and 400 ^{o}C maximum, with energy regulator controlled 400 W hotplate. Mains and load indicator lamps, mains cable. With one each 20 & 40 mm PTFE coated followers and instructions. Designed to prevent spillage from entering the base	12

		structure. For use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	
55	Melting point apparatus	Electrically heated, with adjustable rate of temperature rise, built-in boost heater, accommodates three melting point tubes which can be observed simultaneously by means of full field lens. A cast aluminum case encloses the heating block and controls. Maximum temperature 360^{o}C. For use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	1
56	Melting point tube, Thiele	Borosilicate glass apparatus with side tube to allow stirring by convection of heating liquid.	12
57	Microscale chemistry kit	Set comprises at least: 1 well-plate with about 2 mL and 0.3 mL wells 6 thin stemmed plastic pipets 1 syringe (2 mL, no needle) 1 gas lid set (2 pieces) 2 silicone tubes (4 cm x 4 mm) 1 microburner 1 plastic microstand 8 plastic microspatulas 1 plastic gas collection tube with lid 1 small glass rod 1 zinc and copper electrode set 1 current indicator with crocodile clip 1 glass combustion tube (6 cm x 4 mm)	12 sets

		1 glass fusion tube 1 silicone delivery tube with U-bend	
58	Mortar and pestle	Unglazed inside, glazed outside, with spout, porcelain, external diameter 160 mm.	12
59	Multimeter	Digital display. Automatic or manual range selection. Automatic zero point compensation. Overload protection in all ranges. Measurement ranges: 200 mV to 1000 V d.c. 2 V to 600 V a.c. 200 mA to 10 A d.c./a.c. 200 ohms to 2 megaohms Accuracy: Better than ±2 % for all ranges. Typically below ±1% when reading 2 digits.	12
60	Nichrome wire ※	For flame test, wire length 33 mm, fused into 75 mm glass handle.	12
61	Notebook computer	For interface to the data logger device. Equipped with appropriate communication port(s) compatible with those available from the data logger interface. Other specifications follow the standard provision of IT facilities for schools.	1
62	Organic chemistry glassware	(a) Quickfit, joint size 14/23. (i) Pear shaped flask, 50ml (ii) Still head (iii) Liebig condenser (iv) Screwcap adapter (v) Receiver adapter (vi) Dropping funnel, 50ml, with GP Rotaflo tap (vii) Stopper (viii) Round bottom flask, 25ml	12 sets

		(ix) Air condenser/drying tube	
		(b) Microscale, glass, joint size 14/10.※ (i) Jacket condenser, threaded joint, 80mm (ii) Round bottom flask, 5ml (x4) (iii) Adapter for inlet or thermometer (iv) Distillation adapter, threaded joint (v) Vacuum takeoff adapter, threaded joint (vi) Claisen adapter, threaded joint (vii) Tube for gas collection (viii) Filtering flask, 25ml (ix) Filter funnel, 27mm diameter (x) Septum, teflon-lined silicon rubber (xi) cap, with hole (xii) O-ring, Viton	12 sets
63	Oven	Drying, volume of chamber about 115L. Temperature up to 300°C, with thermoregulator. For use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	1
64	Periodic table, wall chart	Printed on one side only, listing elements of atomic number up to 103, giving the symbol, atomic number and electron shell arrangement for each element and showing the group classification.	1
65	Petri dishes	Clear crystal glass, polished top and bottom, 90 x 15 mm (diameter x depth).	12
66	pH meter	Measuring range 0-14 pH, with combination electrode and temperature compensator. For use on 220-240 V, 50 Hz, single phase a.c. supplies or battery operated. Digital display.	6

67	Pipe-clay triangle	Length of sides 50 mm.	24
68	Pipette [@]	Bulb type, single graduation on upper stem.	
		(a) 10 mL [※]	45
		(b) 25 mL	45
69	Pipette, graduated [@]	Fast-flow, with permanent graduations.	
		(a) 1 mL, subdivision 0.01 mL	12
		(b) 5 mL, subdivision 0.05 mL	12
		(c) 10 mL, subdivision 0.1 mL	24
70	Pipette filler	Ear syringe, rubber	45
71	Pipettor [※]	(a) Digital micropipettes, with adjustable volume from 0.1 ml to 1ml.	6
		(b) Disposable pipette tips, capacity from 0.1ml to 1 ml, pack of 500.	1 pack
72	Polymer kit	Comprising 8 containers of polythene, polystyrene, perspex, PVC, polypropene, nylon, bakelite and urea methanal of 80 g each. Each kind of plastic being contained in plastic vial.	1 kit
73	Porous pot	Cylindrical, 150 x 50 mm (height x diameter).	1
74	Printer, inkjet	Specifications follow the standard provision of IT facilities for schools.	1
75	Pump, filter	Plastic with integral non-return valve, water inlet for flexible pressure tubing and vacuum nozzle for about 10 mm bore tubing.	12
76	Rack	(a) Burette, for holding 12 burettes.	4
		(b) Pipette, for holding 24 pipettes.	2
		(c) Test tube, for holding test tubes of 22 mm and 32 mm diameters.	24

77	Refrigerator	Please refer to the end of this list for detail specifications.	1
78	Respirator with filter cartridge	(a) Respirator. Moulded rubber body with anodised aluminum screw retainer. Fitted with two relief valves and an adjustable elastic band.	1
		(b) Filter cartridge. For use in the presence of common organic vapours and acid gases. [@]	3 pairs
79	Retort stand with boss and clamp	Retort stand base, iron with corrosion resistant finish, minimum size 160 x 100 mm. Stand rod, cadmium plated mild steel/bright aluminum alloy, 500 x 12 mm (length x diameter). Clamp enables articles from 2 to 90 mm diameter to be clamped securely. Design of the jaw ensures a firm grip at all angles of opening. The cork liners for the jaws are well secured. With 8 mm diameter rod suitable for use in bosshead. Bosshead with offset jaws for rods up to 16 mm diameter.	45
80	Rubber bung [@]	Assorted sizes.	
		(a) Single hole	80
		(b) Double hole	80
		(c) Solid (without holes)	200
81	Safety goggles	Splash-proof. With single replaceable wide-angle clear polycarbonate lens, indirectly ventilated, flexible clear PVC frame for all-round vision. Fitted with adjustable headband with retained ends.	1

82	Safety screen	Transparent polycarbonate, comprising central panel about 600 x 300 x 3 mm (height x width x thickness) connected to outer panels of 600 x 230 x 3 mm (height x width x thickness) on each side by full height hinges.	1
83	Safety spectacles [@]	Constructed of polycarbonate, spectacle type with side shields giving all round protection. Top guard and lip prevents spillage into eyes. May be worn over prescription spectacles.	45
84	Screw-neck tube[※]	Glass, round bottomed, screw neck, with cap, 160mm x 16mm.	100
85	Seperating funnel holder[※]	Support separating funnels with a minimum diameter of 86 mm. Suitable for rods 9.5 - 13mm diameter.	12
86	Shield, face	With curved hard plastic visor which can be raised from the face when not required, with adjustable headband.	1
87	Spatula	Stainless steel, overall length about 150 mm.	36
88	Spill pack [@]	The spill pack is made up of six containers each with enough absorbent material to absorb a spillage of up to 500 mL. Two packets of soda ash are also provided for neutralization of acid spills. Supplied with instructions and ten stout polythene bags for collection of spillage.	1 pack
89	Spoon, combustion	Steel with brass flange, length 350 mm, diameter of cover about 88 mm, of cap about 18 mm.	24

90	Stirrer bar ※	Made of PTFE, 20 mm length.	12
91	Stop watch	Digital display, reads up to 60 minutes, accuracy at least 0.2 s, with start/stop/reset buttons.	12
92	Syringe	(a) Precision ground, gas tight, heat resistant glass, free-running capacity 100 mL, graduated at 1 mL intervals, outlet tube 7 mm diameter.	12
		(b) Polypropene, synthetic rubber piston with tapered nozzle. Withstand temperature up to 125^{o}C. Capacity 50 mL, graduated in 1 mL interval. @	12
		(c) Disposable, graduated, with plastic fitting, clear polystyrene barrel, 10 mL. @	45
		(d) Disposable, graduated, with plastic fitting, clear polystyrene barrel, 5 mL. @	45
93	Test tube @	Medium wall, with rim.	
		(a) Pyrex or equivalent, 150 x 24 mm.	100
		(b) Pyrex or equivalent, 150 x 18 mm.	900
		(c) Glass, 75 x 10 mm.	200
94	Test tube holder	With steel spring, to take tubes up to 19 mm diameter, length about 185 mm.	45
95	Thermometer	Non-mercury, with reinforced bulb and permanent graduations.	
		(a) -10^{o}C to 110^{o}C x 1^{o}C , 305mm length.	12
		(b) -10^{o}C to 110^{o}C x 1^{o}C , 155mm length. ※	12
		(c) -10^{o}C to 300^{o}C x 1^{o}C , 305mm length.	12
96	Thin layer chromatography plate ※	Flexible silica gel plates, layer 250 μm, aluminium backing, without fluorescent indicator, 20cm x 20cm.	1 pack

97	Tile ※	White ceramic, 105x105mm.	45
98	Tongs, crucible	Stainless steel, straight with flattened hinge, 200 mm.	24
99	T-piece @	Glass, 6 mm bore.	12
100	Tripod stand	Triangular top, cast iron, with splayed steel legs, 150 x 210 mm (length of side x height).	24
101	Trolley	Apparatus, four wheels, stainless steel frame, stainless steel trays of size about 760 x 460 mm, height of top tray about 900 mm, height between trays about 350 mm.	4
102	Trough	Plastic, 350 x 150 mm (diameter x depth).	2
103	Tube, capillary @	For melting point determination, open at both ends, 100 x 1.8 to 2.0 mm (length x diameter). Pack of 100.	10 packs
104	Tubing, Bunsen / Teclu burner @	Rubber, with indication of Approval Mark & Expiry Date of Service Life on hose surface. About 9 mm internal bore, not more than 2m length, for either town gas or liquefied petroleum gas depending on the supplied.	25
105	Tubing, rubber @	(a) Normal wall, 3 x 1.5 mm (bore x wall thickness). (b) Normal wall, 5 x 1.5 mm (bore x wall thickness). (c) Normal wall, 8 x 1.5 mm (bore x wall thickness).	10m 10m 10m
106	U-tube @	Glass, 125 x 15 mm (height x external diameter).	12

107	Wash bottle	White translucent, flexible, with screw cap and bent tube, polyethene, 250 mL capacity.	45
108	Watch glass [@]	Ground edge, 100-120 mm diameter.	24
109	Water bath	(a) Bath Unit. Unstirred thermostatic bath. Made of stainless steel. Capacity 22 L. Has a sheathed immersion element incorporating a safety cut-out. Heater power 1,500 W. Temperature range ambient to 100^{o}C, sensitivity ±0.3^{o}C, uniformity ±0.1^{o}C. The bath has an illuminated ON/OFF switch and a heater indicator lamp. With stainless steel lid bearing an insulated handle.	1
		(b) Stainless steel test tube racks for holding test tubes of 24 mm diameter.	2
110	Wire gauze [##]	Ceramic centred, asbestos free, 150 x 150 mm.	24
111	Y-piece [@]	Glass, 6 mm bore.	5
	CHEMICALS (The following items are consumables)		
112	Agar		100g
113	Aluminum foil		250 g
114	Aluminum oxide		500 g
115	Aluminum sulphate		500 g
116	Ammonia solution, 0.880		2.5 L
117	Ammonium carbonate		500 g

118	Ammonium chloride		1 kg
119	Ammonium iron(II) sulphate		500 g
120	Ammonium iron(III) sulphate		500 g
121	Ammonium molybdate		100 g
122	Ammonium nitrate		250 g
123	Ammonium sulphate		500 g
124	Ammonium vanadate(V)		100 g
125	Barium chloride		500 g
126	Barium nitrate		250g
127	Bromine, 1 mL ampoules		2 ampoules
128	1-Bromobutane		100 mL
129	Buffer solution, pH 4 ※		1 L
130	Buffer solution, pH 7 ※		1 L
131	Butanal		250 mL
132	Butan-1-ol		500 mL
133	Butan-2-ol		500 mL
134	Butanone		500 mL
135	Calcium carbonate, marble chips		500 g

136	Calcium carbonate, powder		500 g
137	Calcium chloride, anhydrous		1 kg
138	Calcium hydroxide		1 kg
139	Calcium nitrate		500 g
140	Calcium oxide		500 g
141	Calcium sulphate		500 g
142	Calcium turnings		50 g
143	Castor oil		250 mL
144	Charcoal block		24
145	Charcoal, wood powder		500 g
146	1-Chlorobutane		100 mL
147	Chromium(III) chloride		100 g
148	Citric acid		100 g
149	Cobalt(II) chloride		250 g
150	Cobalt(II) nitrate		200 g
151	Copper(II) carbonate		500 g
152	Copper(II) chloride		250 g
153	Copper(II) oxide		250 g

154	Copper(II) sulphate-5- water		1kg
155	Copper, foil		500 g
156	Copper, turnings		500g
157	Cotton wool, absorbent		2 reels
158	Crude oil, artificial		500 mL
159	Cyclohexane		250 mL
160	Cyclohexanol		250 mL
161	Cylohexene		250 mL
162	2,6-dichloroindophenol sodium salt		10g
163	Dichloromethane		250mL
164	2,4-Dinitrophenylhydrazine, moistened with 33% w/w water		25 g
165	Ethanal		500 mL
166	Ethanamide		100 g
167	Ethanedioic acid		500g
168	Ethanoic acid, glacial		500 mL
169	Ethanol, 95%		2.5 L
170	Ethoxyethane		250 mL
171	Ethyl ethanoate		500 mL

172	Ethylenediaminetetraethanoic acid, disodium salt		250 g
173	Glucose		250 g
174	n-Hexane		500 mL
175	Hexane-1,6-diamine		25 g
176	Hexanedioyl dichloride		25 mL
177	Hydrochloric acid, conc.		5 L
178	Hydrogen peroxide, 30%		250 mL
179	Iodine		100 g
180	1-Iodobutane		50 mL
181	Iron(II) sulphate		100 g
182	Iron(II) sulphide		250 g
183	Iron(III) chloride		500 g
184	Iron(III) nitrate		250 g
185	Iron(III) oxide, powder		500 g
186	Iron(III) sulphate		500 g
187	Iron, fine clean filings		500 g
188	Iron, wire, 30 s.w.g.		1 reel of 28g
189	Lead, foil		500 g

190	Lead(II) bromide		250 g
191	Lead(II) chloride		100 g
192	Lead(II) nitrate		500 g
193	Lead(II) oxide		250 g
194	Lithium chloride		50 g
195	Litmus, granulated		50 g
196	Magnesium, ribbon		2 reels of 25g
197	Magnesium carbonate		500 g
198	Magnesium sulphate, anhydrous		500 g
199	Magnesium sulphate-7-water		500 g
200	Manganese(II) chloride		250 g
201	Manganese(IV) oxide		500 g
202	Manganese(II) sulphate-4-water		500g
203	Methanal		500 mL
204	Methanoic acid		250 mL
205	Methanol		500 mL
206	Methyl orange		25 g
207	Methyl red		25 g

208	2-Methylpropan-1-ol		500 mL
209	2-Methylpropan-2-ol		500 mL
210	Nickel, plate		500 g
211	Nickel(II) chloride		250 g
212	Nickel(II) sulphate		250 g
213	Nitric acid, conc.		2.5 L
214	Paraffin oil		500 mL
215	Pentan-1-ol		500 mL
216	Phenol red		5 g
217	Phenolphthalein		25 g
218	Phosphoric(V) acid		500 mL
219	Phosphorus(V) oxide		100 g
220	Potassium bromate		250 g
221	Potassium bromide		250 g
222	Potassium carbonate		500 g
223	Potassium chloride		250 g
224	Potassium chromate(VI)		100 g
225	Potassium dichromate(VI)		500 g
226	Potassium hexacyanoferrate(III)		250 g

227	Potassium hydrogencarbonate		250 g
228	Potassium hydroxide, pellets		500 g
229	Potassium iodate(V)		250 g
230	Potassium iodide		250 g
231	Potassium manganate(VII)**		500 g
232	Potassium nitrate		500 g
233	Potassium sulphate		500 g
234	Potassium thiocyanate		250 g
235	Propan-1,2,3-triol		500 mL
236	Propan-1-ol		500 mL
237	Propan-2-ol		500 mL
238	Propanal		250 mL
239	Propanone		2.5 L
240	Pumice stone		200 g
241	Rocksil		250 g
242	Silica gel, pore size 60		100g
243	Silicon(IV) oxide		500
244	Silver nitrate		50 g

245	Silver oxide		25 g
246	Soda lime		500 g
247	Sodium		25g
248	Sodium bromide		250 g
249	Sodium carbonate, anhydrous		500g
250	Sodium chloride, fine		2 kg
251	Sodium citrate		100 g
252	Sodium hydrogencarbonate		500 g
253	Sodium hydrogensulphite		500 g
254	Sodium hydroxide, pellets		1 kg
255	Sodium iodide		250 g
256	Sodium nitrate		250 g
257	Sodium nitrite		250 g
258	Sodium peroxide		100 g
259	Sodium sulphate		500 g
260	Sodium sulphite		250 g
261	Sodium thiosulphate		500 g
262	Starch		250 g

263	Strontium chloride		100 g
264	Strontium nitrate		100 g
265	Sucrose		250 g
266	Sulphur, crushed		500g
267	Sulphuric acid, conc.		5 L
268	Test paper, blue litmus (pkt/200)		3 packs
269	Test paper, cobalt chloride (pkt/200)		1 pack
270	Test paper, lead ethanoate (pkt/200)		1 pack
271	Test paper, neutral litmus (pkt/200)		3 packs
272	Test paper, pH, range 1-14 (pkt/200)		12 packs
273	Test paper, red litmus (pkt/200)		3 packs
274	Test paper, starch iodide (pkt/200)		1 pack
275	Tin, foil		100 g
276	Tin(II) chloride		100 g
277	Tin(IV) chloride		100 g
278	Universal indicator		100 mL

279	Urea		500 g
280	Vaseline		100 g
281	Volasil 244		500 mL
282	Wooden splints (pkt/1000)		1 pack
283	Zinc carbonate		250 g
284	Zinc chloride		250 g
285	Zinc nitrate		100 g
286	Zinc sulphate-7-water		500 g
287	Zinc, foil		250 g
288	Zinc, granulated		500g
	FURNITURE		
289	Box, first-aid	Single door, 280 x 280 x 110 mm (width x depth x height)	1
290	Stool	Wooden or polypropylene seat, 300 mm x 300 mm, 530 mm height	45
291	Chemical waste storage cupboard	Overall dimension 910 mm (W) x 460 mm (D) x 1830 mm (H) Steel, double door, fitted with 3-point locking espagnolette bolt, controlled by 6-level lock with one adjustable shelf. With words "CHEMICAL WASTES 化學廢物" (not less than 60 mm in height) printed clearly and boldly in red on a white background on the left door. 4	2

		ventilation holes on each side. Rust proof finish. Olive brown colour.	
292	Stainless steel spill catcher tray	Overall dimension 380 mm (W) x 145 mm (D) x 380 mm (H).	6
293	Heavy-duty plastic spill catcher tray	Overall dimension 380 mm (W) x 362 (D) x 380 mm (H).	6

Remark:
This list is for reference only. The items and the quantities to be purchased are subject to the types of practical activities planned and the size of the classes.

Notes:

** Potassium manganate(VII) is regarded as one of the controlled chemicals under the Control of Chemicals Ordinance. Schools wishing to acquire potassium manganate(VII) for experimental purpose must apply for a Storage Approval from Customs and Excise Department (Tel. 2541 4383). For more information about the controlled chemicals, please refer to the website http://www.customs.gov.hk/eng/major_licence_chemicals_e.html.

@ Consumable items

※ New items

-The asbestos-free requirement should be clearly specified when purchasing the item. As a safeguarding measure, schools may consider requesting suppliers to provide evidence (e.g. laboratory testing report) authenticating their products are free of asbestos.
- School may also consider using other alternatives e.g. stainless steel bench mat if suppliers fail to authenticate their products are free of asbestos.

-The asbestos-free requirement should be clearly specified when purchasing the item. As a safeguarding measure, schools may consider requesting suppliers to provide evidence (e.g.

laboratory testing report) authenticating their products are free of asbestos.

- School may also consider using other alternatives e.g. wire gauze without the ceramic center if suppliers fail to authenticate their products are free of asbestos.

Specifications of Item No. 77: Refrigerator

1 *General*: domestic; double door; semi-automatic defrost; two star (2*) as a minimum.

2 *Food Storage Capacity*: about 180-210 L net capacity.

3 *Duty:*

(a) The refrigerator is to be completely suitable for operation in ambient temperature up to 43 ^{o}C and R.H. of 95%. The normal test conditions for acceptance of the equipment will be 35 ^{o}C and 85% R.H. and under these conditions the condensing unit must be of adequate capacity to maintain the conditions shown below. There shall be no condensation present on the cabinet exterior under the test condition.

(b) With the thermostat set at the mid position and with normal cabinet loading conditions, the main food storage section of the cabinet should be capable of achieving a stabilized condition of 5 ^{o}C - 7 ^{o}C average or below with the cabinet door opened for periods of 40 seconds every 30 minutes, under the test condition.

(c) By adjustment of the thermostat, the refrigerating system should also be capable of maintaining an average cabinet temperature of 3 ^{o}C ± 1 ^{o}C with a maximum temperature differential (fluctuation) of 3 ^{o}C in ambient temperature ranging from 18 ^{o}C to 43 ^{o}C.

(d) The average temperature of the frozen food storage compartment shall be as specified under the star rating requirement. Full width evaporator compartment unit shall be specified as two star (2*) as a minimum. Star ratings shall be in accordance with British Standards 3456 and 3739, with two star (2*) meaning not more than -12 ^{o}C in freezer compartment test packages. The maximum permissible temperature differential must not exceed -3 ^{o}C.

(e) The refrigerator shall be capable of freezing an amount of water to solid ice equal to or greater than twice the volume of ice trays supplied in 4 hours. The unit shall also be capable of producing and storing a minimum of 3 kg of solid, hard ice in a twenty-four hour period.

4 *Dimensions*: shall not exceed 1600 mm in height.

5 Defrosting: semi-automatic defrost system with all defrost water being disposed of internally within the cabinet; "frost-free" units may also be considered.

6 *Construction and External Finish:*

(a) The cabinet is to be all steel construction designed for maximum rigidity and robustness to prevent distortion during handling, transportation, etc.

(b) Concealed adjustable feet are to be fitted to ensure that the cabinet will stand firm on uneven floors.

(c) High quality steel panel-work treated with a suitable rust preventive primer and anti-corrosion undercoat and finish material giving maximum resistance to abrasion and corrosion is needed.

7 *Door:*

(a) The cabinet shall be fitted with two flush-fitting doors finished to match the cabinet, designed to withstand heavy usage and suitably braced or otherwise to prevent distortion in usage.

(b) The doors should be furnished with chromium plated fasteners and semi-concealed door hinges. They are to be completed with bottle racks, cheese and butter storage sections.

(c) The plastic door liner must be uniform in thickness (gauge) throughout particularly in relation to all inner radiused corners and be sufficiently rigid to prevent sagging when fully loaded with bottles etc. Bottle retainer strips shall be robustly constructed and secured.

(d) Magnetic locks are acceptable.

8 Internal Liner: heavy gauge enamelling quality steel one piece internal lining, with a generous radius to all corners and finished in white porcelain enamel, with acid-resisting base or proven quality high impact plastic liner of rigid of rigid construction and uniform thickness (gauge) throughout.

9 Breaker Strips: properly sized and installed to prevent popping out or removal in normal usage but shall be easily removable by trained service personnel without damage; the bottom breaker strip shall be sealed along the bottom and sides against entry of water from the bottom of the food liner.

10 Plastic Components: shall not impart noticeable odour or taste to food or water and shall be capable of withstanding use and storage conditions from -18 ^{o}C to 60 ^{o}C without crazing, cracking or permanently distorting.

11 *Insulation:*

(a) Insulation, when fiberglass, shall be so positioned in the cabinet and door so as to prevent settling. Loose filled insulation shall not be used. When foamed in place insulation is used, it shall be injected so as to provide a proper density and be without voids.

(b) The temperature on the outer surface of the refrigerator shall not be more than 4 ^{o}C below the ambient temperature when the refrigerator is operating in an ambient temperature of 43 ^{o}C and is held at its lowest thermostat setting for a period of 8 hours. Surfaces that are part of the refrigerator system or immediately adjacent thereto are excluded as points of measurement.

(c) The insulation area shall be sealed externally and internally to prevent the entry of water or water vapour from usage or cleaning.

(d) The insulation shall be of sufficient thickness to preclude condensation on any visible portion when exposed to the test condition shown under the "Duty" Clause.

12 Door Gasket: of the "Standard" or "Magnetic" type; should be robust and manufactured from a rubber base material in preference to plastic; should contain a fungoid inhibitor; for magnetic gaskets, the magnetic ceramic insert must be of full length on all sides with no gaps at the corners.

13 Shelves and Supports: made of either wire or bar; adequately protected against rusting and corrosion; must be sufficiently rigid to prevent distortion under full load conditions; spaced sufficiently closely to prevent small base containers from toppling and spilling their contents.

14 Welds and Solder Joints: wire brushed clean and washed with hot water or a suitable solvent to prevent corrosion.

15 *Internal Lighting:*

(a) The main food storage section (chiller) shall be supplied with an interior light of sufficient capacity to illuminate the entire interior. The light shall be activated by a door operated switch.

(b) Both the light and switch shall be protected from condensate drip.

16 *Evaporator:*

(a) The evaporator should consist of copper tubes soldered to the sides and bottom of a nonferrous metal shell (the whole being tinned/plated after fabrication) or be manufactured in aluminum with the coils formed on the underside and sides of the shell (the inner surfaces should preferably be flat).

(b) Ice trays of suitable design are to be included.

(c) With the exception of equipment designed for frost free operation, the refrigerator shall be provided with a drip tray of sufficient size with an anti-frost device and adequately sized drain, designed to prevent easy blockage, leading to the integral condensate disposal system.

17 *Refrigerator Unit:*

(a) The refrigerator unit shall be of the sealed unit type, hermetically sealed in a steel casing to suit mains supply voltage of 220-240 V, single phase a.c. 50 Hz, and fitted with an automatic self-resetting motor overload device.

(b) The unit and transformer, if applicable, shall be free from radio and TV reception interference.

(c) For refrigerators fitted with integral transformers, the quoted price in the tender shall include the cost of the transformer.

18 Condenser: of robust construction and of natural or forced convection type designed for maximum efficiency.

19 Controls: fitted with a finger-tip adjustable thermostat automatically maintaining the desired storage temperature and including Fast Freezing, Defrost, and Off position.

20 *Refrigerant*: non-toxic, non-explosive and odourless.

21 *Electric:*

(a) All electrical components and cabling shall conform to the appropriate British Standard Specifications, or shall be of fully equivalent capacity and quality.

(b) The refrigerator shall be fitted with a 3 metre long 3 core 0.75 mm^2 rubber or PVC covered cable and a 3 rectangular pin 13 amp B.S.S. plug.

22 *Technical Literature:*

(a) The following manufacturer's literature shall be supplied:

(i) 4 copies of Service Manual;

(ii) 4 copies of Spare Parts List;

(iii) One copy of the owner's instruction booklet to be supplied with each refrigerator.

(b) Supplier should also state whether additional copies of (iii) above can be supplied on request and whether free of charge, or at a price.

23 *Spares:*

(a) The supplier should guarantee a supply of any spare parts required within a period of four months from the date of the receipt of any order of such spares.

(b) A price list should be submitted with the quotation covering the parts listed below plus any others as recommended by the manufacturer.

Light Switch	Crisper
Light Socket	Crisper Cover
Light Bulb	Temperature Control
Overload Protection Unit	Ice Cube Tray
Starter Relay	Door Handle
	Door Gasket

24. Damaged in Transit: any parts damaged in transit should be replaced by factory finished product (for government schools only: No repair work should be made without prior consent of Government).

25 *Warranty:*

(a) The refrigerator shall be guaranteed against faulty material and workmanship for a period of one year from the date of acceptance.

(b) In addition, the hermetically sealed refrigeration system shall be similarly guaranteed for further four years after the expiry of (a) above.

(c) All materials and labour required within the above warranty periods shall be supplied free of charge unless occasioned by misuse or negligence.

Reference List of Furniture and Equipment for Secondary School

Subjec : NSS Combined Science (Chemistry Part)

Remark: All the items are shared with NSS Chemistry. Purchase of additional items is not required if a school also offers NSS Chemistry at the same time.

Item No.	Item	Description	Quantity
	EQUIPMENT		
1	Absorption tube [@]	(a) Straight, 145 x 17 mm.	2
		(b) U-form with side tube.	2
2	Aspirator bottle	With stopcock and plastic screw cap, polyethene.	
		(a) 5 L	4
		(b) 10 L	2
		(c) 20 L	2
3	Atomic model	(a) Skeletal	
		Comprises plastic spheres and flexible connectors representing atoms and bonds respectively. The spheres are in a variety of colours, and are number and/or letter coded for easy identification. There should be at least the following numbers and types of spheres (representing atoms of different elements, with oxidation states indicated in parentheses) for building a wide range of open type models: 14 metal(I, II, III, IV, VI), 8 halogen(I), 22 oxygen(I, II, IV), 13 sulphur(II, IV, VI), 10 nitrogen(III, V), 6 carbon(IV), 7 phosphorus(III, IV, V) and 14 hydrogen(I, II). The connectors should be of two different lengths (at least 50 medium and 36 long) for building the open structures. The set contains a storage box and an instruction booklet for building simple organic and inorganic structures.	1 set
		(b) Lattice Set	1 set

		Contains 380 atom centres. With 8 to 12 coordinate atom centres to allow construction of complex models. Instructions cover construction of 7 crystal systems, diamond, graphite, metals, sodium chloride, zinc blend and wurtzite, 8 coordinated ionic structures, rutile, ice and layer structures.	
4	Balance	Electronic, capacity 200 g. Taring range 100 g or above. For use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	
		(a) Readability 0.01 g, with USB or RS-232C data output terminal and connection cable.	2
		(b) Readability 1 mg.	2
5	Barrier tape [@]	PVC tape, non-adhesive backing, for highlighting hazard/ restricted areas, 50 mm x 3 m.	2 rolls
6	Basin, evaporating [@]	Porcelain, shallow form with spout and glazed.	
		(a) 75 mL capacity, 80 x 30 mm. (diameter x depth)	24
		(b) 225 mL capacity, 110 x 45 mm. (diameter x depth)	12
7	Beaker [@]	Squat form, with spout, with two or more graduation marks showing approximate capacities.	
		(a) Pyrex or equivalent, 50 mL	45
		(b) Pyrex or equivalent, 100 mL	90
		(c) Pyrex or equivalent, 250 mL	90
		(d) Pyrex or equivalent, 600 mL	12
		(e) Pyrex or equivalent, 1 L	3
		(f) Polypropene or equivalent, 250 mL [※]	90
		(g) Polypropene, 2 L	4
8	Beehive shelf	Earthenware, glazed, 75mm diameter.	12

9	Bench mat #	Make of glass reinforced cement, asbestos free, about 300 x 300 mm, 4.5 mm thick.	12
10	Bottle, dropping	A three-piece pipette section comprising a stout glass dropper, high density polyethene stopper with dust-proof head and vinyl teat fitted to a bottle of	
		(a) Clear glass, 100 mL	60
		(b) Amber glass, 100 mL	60
11	Bottle, narrow mouth	With dust-proof stopper.	
		(a) Clear glass, 250 mL	30
		(b) Amber glass, 250 mL	90
		(c) Clear glass, 500 mL	20
		(d) Amber glass, 500 mL	15
12	Bottle, wide mouth	With dust-proof stopper.	
		(a) Clear glass, 250 mL	60
		(b) Amber glass, 250 mL	20
13	Bottle top dispenser ※	Bottle top and digital, with alternative adaptors for different bottle sizes, accuracy within 1%.	3
14	Brush	(a) For test tubes of diameter 10 to 12 mm. Nylon, diameter of head 15 mm.	12
		(b) For test tubes of diameter 16 to 25 mm. Nylon, diameter of head 30 mm.	12
		(c) For burette of capacity 50 mL. Nylon, diameter of head 19 mm, overall length 750mm.	12
15	Burette	With teflon stopcock, 50 mL in 0.1 mL graduations.	45
16	Burette clamp	Fitting retort stand rod up to 13 mm diameter.	45
17	Burner	(a) Bunsen	24

		For either town gas or liquefied petroleum gas depending on the type supplied. Nickel plated burner tube with rotatable air regulator and tapering, riffled connector, mounted on an enamelled pressed-steel base. Burner tube 100 x 13 mm (height x diameter), base 80 mm diameter, connector 10 mm mean outer diameter.	
		(b) Teclu For either town gas or liquefied petroleum gas depending on the type supplied. Nickel-plated burner tube with a threaded disc valve for adjustment of air/gas mixture. Burner tube 105 x 13 mm (height x diameter), base 80 mm diameter, connector 10 mm mean outer diameter.	1
18	Clips	(a) Mohr, plated metal, accepts tubing of maximum diameter 15 mm.	12
		(b) Hoffman, plated metal, with clamp screw and hinged bottom plate, width between bars 20 mm.	12
		(c) Crocodile, small. [@]	60
		(d) Joint clip, made of PTFE, for retaining glassware having Quickfit conical joints with joint size 14/23. [※]	36
19	Cobalt glass	For flame test, 25 x 50mm.	12
20	Colorimeter	With seven or more colour filters for wavelength range 400-700 nm, filter holder and tube cover. Absorbance range 0-2. Digital or analog display. Data output 0-1 V. Accommodates 10 mm cuvettes or 16 mm test tubes. Battery operated or for use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	6
21	Combustion tube [@]	Borosilicate glass, open both ends, 300 x 20 mm (length x external diameter).	12

22	Cork [@]	Tapered, assorted sizes, pack of 144.	1 pack
23	Cork borer set	Borer, set of 6 from 4 to 10 mm. Plated metal. Cutting tube mounted with safety under-flange in shaped handle ensuring that operator cannot be injured by a dislodged tube. With rod for clearing borers. Sharpener, plated metal cone with hinged cutter blade set in slot and metal handle. Circular shape of borer maintained by cone. Edge cut to correct angle by depressing blade using thumb pressure button and rotating borer.	1 set
24	Crucible [@]	Porcelain, squat form, glazed inside and outside, unglazed base, with lid, 43 x 23 mm (diameter x depth).	24
25	Cylinder, graduated	With spout.	
		(a) Glass or plastic, 10 mL	12
		(b) Glass or plastic, 25 mL	12
		(c) Glass or plastic, 50 mL	12
		(d) Glass or plastic, 100 mL	24
		(e) Glass or plastic, 500 mL	2
		(f) Glass or platic, 1 L	1
		(g) Polypropene, 3 L (graduated pitcher)	1
26	Data logger interface	Hardware: The interface can log data from appropriate sensors by connecting to a Windows-compatible computer through a common communication port, such as serial port, parallel port and USB. It has also remote data logging capability without a computer. Provided with a combination of at least 3 analog and digital I/O channels. Analog and digital inputs can be recorded simultaneously. Sampling rates: 16kHz or above. Power supply: both battery operated and for mains voltage of 220- 240V, 50 Hz, single phase a.c. supplies; provided with d.c.	2 sets

		adapter and connecting cables.	
		Software: Runs on English/Chinese MS Windows 9x, NT, XP and Vista; displays and analyzes data in the forms of analog and digital meters, graphs, tables or oscilloscopes.	
27	Data logger sensors	The sensors should be fully compatible with the data logger interface.	
		(a) Colorimeter sensor: For measuring transmittance (30%-90%) of light (400-700 nm) through a solution, with cuvettes and caps.	2
		(b) Conductivity sensor: For measuring conductivity (0-20,000 mS/cm) in aqueous solutions.	2
		(c) High temperature sensor: For measuring temperatures ranging from -200^{o}C to +1000^{o}C, with an accuracy of ±3^{o}C	2
		(d) Temperature sensor: For measuring temperatures ranging from -35^{o}C to +135^{o}C, with an accuracy of ±0.5^{o}C.	2
		(e) Light sensor: For measuring light intensity level, suitable for indoor and outdoor experiments with spectral response: 400-1000 nm.	2
		(f) pH sensor: For measuring pH values ranging from 0-14 with an accuracy of ±2%.	2
		(g) Pressure sensor: For measuring gas pressure ranging from 0 to 500 kPa.	2
		(h) Voltage/Current sensor: For measuring a.c. and d.c. currents/voltage. Voltage range: ±10 volts. Current range: ±1 amp.	2

28	Deioniser	(a) Wall mounting or bench standing. With battery operated water purity meter. For use with disposable mixed bed resin. Output: 100 to 1000 L of tap water depending on hardness. Flow rate: up to 100 L/hr. Effluent quality: conductivity 2mS/cm, residual solid <10.0 ppm, pH 6-7. (b) Cartridge of mixed bed ion-exchange resin.	1 1
29	Desiccator	Glass, with knob cover and perforated metal/porcelain disc, 210 mm top internal diameter, 190 mm disc diameter, 85 mm depth of disc below flange.	2
30	Digital thermometer	Digital display, stainless steel probe, -50^{o}C to 150^{o}C x 0.1^{o}C, battery operated, probe sheath.	12
31	Electrode	(a) Carbon, 100 x 5 mm (length x diameter). [@] (b) Platinum foil, mounted in glass tube with 4 mm socket.	48 12
32	Electrode holder	Plastic holder about 80 x 20 x12 mm (length x width x height) with two crocodile clips for holding rod/foil electrodes.	12
33	Electrolysis cell	Comprises stout open ended glass tube, the lower end of which accommodates a tight-fitting rubber stopper fitted with two tapered carbon electrodes. Connection made by crocodile clips. Short-circuiting of electrodes is prevented by a strip of insulating material set into the rubber between the leads.	12
34	Eye wash unit	Equipped with an eye wash bottle. With dust cap for eye bath and side tube for draining of contaminated water. The bottle is clipped into a moulded panel on which simple but complete instructions are printed. The panel has holes for	1

		wall hanging.	
35	Filter Paper [@]	(a) Whatman No.1, 7cm diameter.	2 packs
		(b) Whatman No.1, 12.5cm diameter.	5 packs
36	Flask, Buchner	Conical form with heavy wall for vacuum filtration, capacity 250 mL.	3
37	Flask, conical [@]	Narrow mouth, pyrex or equivalent.	
		(a) 100 mL	12
		(b) 250 mL	90
38	Flask, flat bottom [@]	Medium neck, pyrex or equivalent.	
		(a) 250 mL	2
		(b) 500 mL	2
39	Flask, volumetric	Graduated one mark, with inter-changeable plastic stopper, pyrex or equivalent.	
		(a) 100 mL [※]	45
		(b) 250 mL	45
		(c) 1 L	4
		(d) 2 L	1
		(e) 5 L	1
40	Forceps	Blunt ends, stainless steel, length 130 mm.	12
41	Funnel	(a) Buchner, porcelain, for filter paper of 70 mm diameter.	3
		(b) Dropping, cylindrical, open top, with interchangeable teflon stopcock, borosilicate glass, 100 mL.	3
		(c) Filter, plain, soda lime glass, 75 mm top diameter. [@]	45
		(d) Filter, plain, soda lime glass, 150 mm top	3

		diameter. [@]	
		(e) Separating, conical shape, with interchangeable teflon stopcock and polypropene stopper, borosilicate glass, capacity 250 mL.	3
		(f) Thistle, with straight stem, soda lime glass, overall length 300 mm.	3
42	Gas jar, with cover	With base and ground top flange, glass, 50 x 150 mm (diameter x height) with circular glass cover, ground one side, 75 mm diameter.	12
43	Glass rod [@]	Soda lime glass, in length of about 1.5 m, 6 mm diameter.	1kg
44	Glass tubing [@]	Soda lime glass, in length of about 1.5 m, 8 mm external diameter. Pack of 25.	1 pack
45	Gloves	(a) Chemical resistant, for handling acids, alkalis and organic solvents, long cuff. Special finish for an excellent wet grip. [@]	2 pairs
		(b) Heat/Cold resistant, made of non-flammable non-asbestos material, with low thermal conductivity, high strength and high abrasion resistance, gives no dermatological problems; for furnace and hotplate work in the laboratory; gauntlet length.	1 pair
		(c) Disposable nitrile gloves. Gives good resistance to abrasion, nicks and cuts and offers superior splash protection against irritating chemicals. 100 pieces a pack. [※]	1 pack
46	Hand protector [※]	Silicon rubber, capable of withstanding temperatures up to 250^{o}C.	12
47	Hazard warning labels [@]	Self-adhesive labels printed with various hazard symbols plus the appropriate hazard wording. Sheets of mixed symbols cover chemical hazards of toxic, harmful, corrosive, irritant, explosive,	1 pack

		flammable and oxidising. Pack of about 100 for each symbol.	
48	Heating mantle ※	For round bottomed flasks up to 250ml, maximum temperature 450 ^{o}C, fitted with earthed energy regulator screen, for use on 220 - 240 V.	2
49	Hoffman voltameter with stand	Two graduated limbs, each of 50 mL capacity, integral with reservoir tube and funnel-shaped bulb, with a stopcock at top of each limb, overall length approximately 650 mm, with interchangeable platinum and carbon electrodes mounted in rubber stoppers for insertion into the voltameter limbs. Supplied with stand.	1 set
50	Hydrogen fuel cell teaching kit	A solar cell module for conversion of radiant energy of light into electrical energy. A PEM electrolyser uses the electrical energy from the solar cell module to split water into hydrogen and oxygen gases, and stored in gas cylinders. A PEM fuel cell recombines the stored gases to produce water and electricity. Load measurement module for setting of various loads (resistances, lamp, motor) and display of voltage and current in the fuel cell circuit. User manual.	1
51	Labels	Plain, gummer, pack of 90.	5 packs
52	Low voltage power supply	Power supply, voltage continuously variable from 0-25 V, a.c. and d.c., maximum current (a.c. & d.c.) 8 A, with output voltage meter, thermal cutout, switch, fuse and pilot light. For use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	6

53	Magnetic stirrer-hotplate	1,300 r.p.m. and 400 ^{o}C maximum, with energy regulator controlled 400 W hotplate. Mains and load indicator lamps, mains cable. With one each 20 & 40 mm PTFE coated followers and instructions. Designed to prevent spillage from entering the base structure. For use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	6
54	Microscale chemistry kit	Set comprises at least: 1 well-plate with about 2 mL and 0.3 mL wells 6 thin stemmed plastic pipets 1 syringe (2 mL, no needle) 1 gas lid set (2 pieces) 2 silicone tubes (4 cm x 4 mm) 1 microburner 1 plastic microstand 8 plastic microspatulas 1 plastic gas collection tube with lid 1 small glass rod 1 zinc and copper electrode set 1 current indicator with crocodile clip 1 glass combustion tube (6 cm x 4 mm) 1 glass fusion tube 1 silicone delivery tube with U-bend	12 sets
55	Mortar and pestle	Unglazed inside, glazed outside, with spout, porcelain, external diameter 160 mm.	12
56	Multimeter	Digital display. Automatic or manual range selection. Automatic zero point compensation. Overload protection in all ranges. Measurement ranges: 200 mV to 1000 V d.c. 2 V to 600 V a.c. 200 mA to 10 A d.c./a.c.	12

		200 ohms to 2 megaohms Accuracy: Better than ±2 % for all ranges. Typically below ±1% when reading 2 digits.	
57	Nichrome wire ※	For flame test, wire length 33 mm, fused into 75 mm glass handle.	12
58	Notebook computer	For interface to the data logger device. Equipped with appropriate communication port(s) compatible with those available from the data logger interface. Other specifications follow the standard provision of IT facilities for schools.	1
59	Organic chemistry glassware	(a) Quickfit, joint size 14/23. (i) Pear shaped flask, 50ml (ii) Still head (iii) Liebig condenser (iv) Screwcap adapter (v) Receiver adapter (vi) Dropping funnel, 50ml, with GP Rotaflo tap (vii) Stopper (viii) Round bottom flask, 25ml (ix) Air condenser/drying tube	12 sets
		(b) Microscale, glass, joint size 14/10.※ (i) Jacket condenser, threaded joint, 80mm (ii) Round bottom flask, 5ml (x4) (iii) Adapter for inlet or thermometer (iv) Distillation adapter, threaded joint (v) Vacuum takeoff adapter, threaded joint (vi) Claisen adapter, threaded joint (vii) Tube for gas collection (viii) Filtering flask, 25ml (ix) Filter funnel, 27mm diameter	12 sets

		(x) Septum, teflon-lined silicon rubber (xi) cap, with hole (xii) O-ring, Viton	
60	Oven	Drying, volume of chamber about 115L. Temperature up to 300°C, with thermoregulator. For use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	1
61	Periodic table, wall chart	Printed on one side only, listing elements of atomic number up to 103, giving the symbol, atomic number and electron shell arrangement for each element and showing the group classification.	1
62	Petri dishes	Clear crystal glass, polished top and bottom, 90 x 15 mm (diameter x depth).	12
63	pH meter	Measuring range 0-14 pH, with combination electrode and temperature compensator. For use on 220-240 V, 50 Hz, single phase a.c. supplies or battery operated. Digital display.	6
64	Pipe-clay triangle	Length of sides 50 mm.	24
65	Pipette [@]	Bulb type, single graduation on upper stem.	
		(a) 10 mL[※]	45
		(b) 25 mL	45
66	Pipette, graduated [@]	Fast-flow, with permanent graduations.	
		(a) 1 mL, subdivision 0.01 mL	12
		(b) 5 mL, subdivision 0.05 mL	12
		(c) 10 mL, subdivision 0.1 mL	24
67	Pipette filler	Ear syringe, rubber	45

68	Pipettor ※	(a) Digital micropipettes, with adjustable volume from 0.1 ml to 1ml. (b) Disposable pipette tips, capacity from 0.1ml to 1 ml, pack of 500.	6 1 pack
69	Polymer kit	Comprising 8 containers of polythene, polystyrene, perspex, PVC, polypropene, nylon, bakelite and urea methanal of 80 g each. Each kind of plastic being contained in plastic vial.	1 kit
70	Porous pot	Cylindrical, 150 x 50 mm (height x diameter).	1
71	Printer, inkjet	Specifications follow the standard provision of IT facilities for schools.	1
72	Pump, filter	Plastic with integral non-return valve, water inlet for flexible pressure tubing and vacuum nozzle for about 10 mm bore tubing.	12
73	Rack	(a) Burette, for holding 12 burettes. (b) Pipette, for holding 24 pipettes. (c) Test tube, for holding test tubes of 22 mm and 32 mm diameters.	4 2 24
74	Refrigerator	Please refer to the end of this list for detail specifications.	1
75	Respirator with filter cartridge	(a) Respirator. Moulded rubber body with anodised aluminum screw retainer. Fitted with two relief valves and an adjustable elastic band. (b) Filter cartridge. For use in the presence of common organic vapours and acid gases. @	1 3 pairs

76	Retort stand with boss and clamp	Retort stand base, iron with corrosion resistant finish, minimum size 160 x 100 mm. Stand rod, cadmium plated mild steel/bright aluminum alloy, 500 x 12 mm (length x diameter). Clamp enables articles from 2 to 90 mm diameter to be clamped securely. Design of the jaw ensures a firm grip at all angles of opening. The cork liners for the jaws are well secured. With 8 mm diameter rod suitable for use in bosshead. Bosshead with offset jaws for rods up to 16 mm diameter.	45
77	Rubber bung [@]	Assorted sizes.	
		(a) Single hole	80
		(b) Double hole	80
		(c) Solid (without holes)	200
78	Safety goggles	Splash-proof. With single replaceable wide-angle clear polycarbonate lens, indirectly ventilated, flexible clear PVC frame for all-round vision. Fitted with adjustable headband with retained ends.	1
79	Safety screen	Transparent polycarbonate, comprising central panel about 600 x 300 x 3 mm (height x width x thickness) connected to outer panels of 600 x 230 x 3 mm (height x width x thickness) on each side by full height hinges.	1
80	Safety spectacles [@]	Constructed of polycarbonate, spectacle type with side shields giving all round protection. Top guard and lip prevents spillage into eyes. May be worn over prescription spectacles.	45
81	Screw-neck tube [※]	Glass, round bottomed, screw neck, with cap, 160mm x 16mm	100
82	Seperating funnel holder [※]	Support separating funnels with a minimum diameter of 86 mm. Suitable for rods 9.5 - 13mm diameter.	3

83	Shield, face	With curved hard plastic visor which can be raised from the face when not required, with adjustable headband.	1
84	Spatula	Stainless steel, overall length about 150 mm.	36
85	Spill pack [@]	The spill pack is made up of six containers each with enough absorbent material to absorb a spillage of up to 500 mL. Two packets of soda ash are also provided for neutralization of acid spills. Supplied with instructions and ten stout polythene bags for collection of spillage.	1 pack
86	Spoon, combustion	Steel with brass flange, length 350 mm, diameter of cover about 88 mm, of cap about 18 mm.	24
87	Stirrer bar [※]	Made of PTFE, 20 mm length.	12
88	Stop watch	Digital display, reads up to 60 minutes, accuracy at least 0.2 s, with start/stop/reset buttons.	12
89	Syringe	(a) Precision ground, gas tight, heat resistant glass, free-running capacity 100 mL, graduated at 1 mL intervals, outlet tube 7 mm diameter.	12
		(b) Polypropene, synthetic rubber piston with tapered nozzle. Withstand temperature up to 125^{o}C. Capacity 50 mL, graduated in 1 mL interval. [@]	12
		(c) Disposable, graduated, with plastic fitting, clear polystyrene barrel, 10 mL. [@]	45
		(d) Disposable, graduated, with plastic fitting, clear polystyrene barrel, 10 mL. [@]	45
90	Test tube [@]	Medium wall, with rim.	
		(a) Pyrex or equivalent, 150 x 24 mm.	100
		(b) Pyrex or equivalent, 150 x 18 mm.	900
		(c) Glass, 75 x 10 mm.	200

91	Test tube holder	With steel spring, to take tubes up to 19 mm diameter, length about 185 mm.	45
92	Thermometer	Non-mercury, with reinforced bulb and permanent graduations.	
		(a) -10°C to 110°C x 1°C , 305mm length.	12
		(b) -10°C to 110°C x 1°C , 155mm length. ※	12
		(c) -10°C to 300°C x 1°C , 305mm length.	12
93	Tile ※	White ceramic, 105x105mm.	45
94	Tongs, crucible	Stainless steel, straight with flattened hinge, 200 mm.	24
95	T-piece @	Glass, 6 mm bore.	12
96	Tripod stand	Triangular top, cast iron, with splayed steel legs, 150 x 210 mm (length of side x height).	24
97	Trolley	Apparatus, four wheels, stainless steel frame, stainless steel trays of size about 760 x 460 mm, height of top tray about 900 mm, height between trays about 350 mm.	4
98	Trough	Plastic, 350 x 150 mm (diameter x depth).	2
99	Tubing, Bunsen / Teclu burner @	Rubber, with indication of Approval Mark & Expiry Date of Service Life on hose surface. About 9 mm internal bore, not more than 2m length, for either town gas or liquefied petroleum gas depending on the supplied.	25
100	Tubing, rubber @	(a) Normal wall, 3 x 1.5 mm (bore x wall thickness).	10m
		(b) Normal wall, 5 x 1.5 mm (bore x wall thickness).	10m

		(c) Normal wall, 8 x 1.5 mm (bore x wall thickness).	10m
101	U-tube [@]	Glass, 125 x 15 mm (height x external diameter).	12
102	Wash bottle	White translucent, flexible, with screw cap and bent tube, polyethene, 250 mL capacity.	45
103	Watch glass [@]	Ground edge, 100-120 mm diameter.	24
104	Water bath	(a) Bath Unit. Unstirred thermostatic bath. Made of stainless steel. Capacity 22 L. Has a sheathed immersion element incorporating a safety cut-out. Heater power 1,500 W. Temperature range ambient to 100°C, sensitivity ±0.3°C, uniformity ±0.1°C. The bath has an illuminated ON/OFF switch and a heater indicator lamp. With stainless steel lid bearing an insulated handle.	1
		(b) Stainless steel test tube racks for holding test tubes of 24 mm diameter.	2
105	Wire gauze [##]	Ceramic centred, asbestos free, 150 x 150 mm.	24
106	Y-piece [@]	Glass, 6 mm bore.	5
	CHEMICALS (The following items are consumables)		
107	Agar		100g
108	Aluminum foil		250 g
109	Aluminum oxide		500 g
110	Aluminum sulphate		500 g

111	Ammonia solution, 0.880		2.5 L	
112	Ammonium carbonate		500 g	
113	Ammonium chloride		1 kg	
114	Ammonium iron(II) sulphate		500g	
115	Ammonium iron(III) sulphate		500g	
116	Ammonium nitrate		250 g	
117	Ammonium sulphate		500 g	
118	Barium chloride		500 g	
119	Barium nitrate		250g	
120	Bromine, 1 mL ampoules		2 ampoules	
121	1-Bromobutane		100 mL	
122	Buffer solution, pH 4 ※		1 L	
123	Buffer solution, pH 7 ※		1 L	
124	Calcium carbonate, marble chips		500g	
125	Calcium carbonate,		500 g	

	powder		
126	Calcium chloride, anhydrous		1 kg
127	Calcium hydroxide		1 kg
128	Calcium nitrate		500 g
129	Calcium oxide		500 g
130	Calcium sulphate		500 g
131	Calcium turnings		50 g
132	Castor oil		250 mL
133	Charcoal block		24
134	Charcoal, wood powder		500 g
135	Chromium(III) chloride		100 g
136	Citric acid		100 g
137	Cobalt(II) chloride		250 g
138	Copper(II) carbonate		500 g
139	Copper(II) chloride		250 g
140	Copper(II) oxide		250 g
141	Copper(II) sulphate-5- water		1kg

142	Copper, foil		500 g
143	Copper, turnings		500g
144	Cotton wool, absorbent		2 reels
145	Crude oil, artificial		500 mL
146	Cyclohexane		250 mL
147	Cylohexene		250 mL
148	Ethanoic acid, glacial		500 mL
149	Ethanol, 95%		2.5 L
150	Glucose		250 g
151	n-Hexane		500 mL
152	Hexane-1,6-diamine		25 g
153	Hexanedioyl dichloride		25 mL
154	Hydrochloric acid, conc.		5 L
155	Hydrogen peroxide, 30%		250 mL
156	Iodine		100g
157	Iron(II) sulphate		100 g

158	Iron(II) sulphide		250 g
159	Iron(III) chloride		500 g
160	Iron(III) nitrate		250 g
161	Iron(III) oxide, powder		500 g
162	Iron, fine clean filings		500 g
163	Iron, wire, 30 s.w.g.		1 reel of 28g
164	Lead, foil		500 g
165	Lead(II) bromide		250 g
166	Lead(II) nitrate		500 g
167	Lead(II) oxide		250 g
168	Magnesium, ribbon		2 reels of 25g
169	Magnesium sulphate, anhydrous		500 g
170	Magnesium sulphate-7-water		500 g
171	Manganese(IV) oxide		500 g
172	Methanol		500 mL
173	Methyl orange		25 g
174	Methyl red		25 g

175	Nickel, plate		500 g
176	Nickel(II) chloride		250 g
177	Nickel(II) sulphate		250 g
178	Nitric acid, conc.		2.5 L
179	Paraffin oil		500 mL
180	Pentan-1-ol		500 mL
181	Phenolphthalein		25 g
182	Phosphoric(V) acid		500 mL
183	Potassium bromide		250 g
184	Potassium chloride		250 g
185	Potassium chromate(VI)		100 g
186	Potassium dichromate(VI)		500 g
187	Potassium hexacyanoferrate(III)		250 g
188	Potassium hydrogencarbonate		250 g
189	Potassium hydroxide, pellets		500 g
190	Potassium iodide		250 g

191	Potassium manganate(VII)**		500 g
192	Potassium nitrate		500 g
193	Potassium sulphate		500 g
194	Propan-1,2,3-triol		500 mL
195	Propan-1-ol		500 mL
196	Pumice stone		200 g
197	Rocksil		250 g
198	Silica gel, pore size 60		100g
199	Silver nitrate		50 g
200	Silver oxide		25 g
201	Soda lime		500 g
202	Sodium		25g
203	Sodium bromide		250 g
204	Sodium carbonate, anhydrous		500g
205	Sodium chloride, fine		2 kg
206	Sodium citrate		100 g
207	Sodium hydrogencarbonate		500 g

208	Sodium hydroxide, pellets		1 kg
209	Sodium iodide		250 g
210	Sodium nitrate		250 g
211	Sodium sulphate		500 g
212	Sodium sulphite		250 g
213	Sodium thiosulphate		500 g
214	Starch		250 g
215	Sucrose		250 g
216	Sulphur, crushed		500g
217	Sulphuric acid, conc.		5 L
218	Test paper, blue litmus (pkt/200)		3 packs
219	Test paper, cobalt chloride (pkt/200)		1 pack
220	Test paper, neutral litmus (pkt/200)		3 packs
221	Test paper, pH, range 1-14 (pkt/200)		12 packs
222	Test paper, red litmus (pkt/200)		3 packs

223	Tin, foil		100 g
224	Universal indicator		100 mL
225	Urea		500 g
226	Vaseline		100 g
227	Volasil 244		500 mL
228	Wooden splints (pkt/1000)		1 pack
229	Zinc carbonate		250 g
230	Zinc chloride		250 g
231	Zinc nitrate		100 g
232	Zinc, foil		250 g
233	Zinc, granulated		500g
	FURNITURE		
234	Box, first-aid	Single door, 280 x 280 x 110 mm (width x depth x height)	1
235	Stool	Wooden or polypropylene seat, 300 mm x 300 mm, 530 mm height	45
236	Chemical waste storage cupboard	Overall dimension 910 mm (W) x 460 mm (D) x 1830 mm (H) Steel, double door, fitted with 3-point locking espagnolette bolt, controlled by 6-level lock with one adjustable shelf. With words "CHEMICAL WASTES 化學廢物" (not less than 60 mm in height) printed clearly and boldly in red	2

		on a white background on the left door. 4 ventilation holes on each side. Rust proof finish. Olive brown colour.		
237	Stainless steel spill catcher tray	Overall dimension 380 mm (W) x 145 mm (D) x 380 mm (H).	6	
238	Heavy-duty plastic spill catcher tray	Overall dimension 380 mm (W) x 362 (D) x 380 mm (H).	6	

Remark:

This list is for reference only. The items and the quantities to be purchased are subject to the types of practical activities planned and the size of the classes.

Notes:

** Potassium manganate(VII) is regarded as one of the controlled chemicals under the Control of Chemicals Ordinance. Schools wishing to acquire potassium manganate(VII) for experimental purpose must apply for a Storage Approval from Customs and Excise Department (Tel. 2541 4383). For more information about the controlled chemicals, please refer to the website http://www.customs.gov.hk/eng/major_licence_chemicals_e.html.

@ Consumable items

※ New item

-The asbestos-free requirement should be clearly specified when purchasing the item. As a safeguarding measure, schools may consider requesting suppliers to provide evidence (e.g. laboratory testing report) authenticating their products are free of asbestos.- School may also consider using other alternatives e.g. stainless steel bench mat if suppliers fail to authenticate their products are free of asbestos.

-The asbestos-free requirement should be clearly specified when purchasing the item. As a safeguarding measure, schools may consider requesting suppliers to provide evidence (e.g. laboratory testing report) authenticating their products are free of asbestos.
- School may also consider using other alternatives e.g. wire gauze without the ceramic center if

suppliers fail to authenticate their products are free of asbestos.

Specifications of Item No. 74: Refrigerator

1 *General*: domestic; double door; semi-automatic defrost; two star (2*) as a minimum.

2 *Food Storage Capacity*: about 180-210 L net capacity.

3 *Duty:*

(a) The refrigerator is to be completely suitable for operation in ambient temperature up to 43 ^{o}C and R.H. of 95%. The normal test conditions for acceptance of the equipment will be 35 ^{o}C and 85% R.H. and under these conditions the condensing unit must be of adequate capacity to maintain the conditions shown below. There shall be no condensation present on the cabinet exterior under the test condition.

(b) With the thermostat set at the mid position and with normal cabinet loading conditions, the main food storage section of the cabinet should be capable of achieving a stabilized condition of 5 ^{o}C - 7 ^{o}C average or below with the cabinet door opened for periods of 40 seconds every 30 minutes, under the test condition.

(c) By adjustment of the thermostat, the refrigerating system should also be capable of maintaining an average cabinet temperature of 3 ^{o}C ± 1 ^{o}C with a maximum temperature differential (fluctuation) of 3 ^{o}C in ambient temperature ranging from 18 ^{o}C to 43 ^{o}C.

(d) The average temperature of the frozen food storage compartment shall be as specified under the star rating requirement. Full width evaporator compartment unit shall be specified as two star (2*) as a minimum. Star ratings shall be in accordance with British Standards 3456 and 3739, with two star (2*) meaning not more than -12 ^{o}C in freezer compartment test packages. The maximum permissible temperature differential must not exceed -3 ^{o}C.

(e) The refrigerator shall be capable of freezing an amount of water to solid ice equal to or greater than twice the volume of ice trays supplied in 4 hours. The unit shall also be capable of producing and storing a minimum of 3 kg of solid, hard ice in a twenty-four hour period.

4 *Dimensions*: shall not exceed 1600 mm in height.

5 Defrosting: semi-automatic defrost system with all defrost water being disposed of internally within the cabinet; "frost-free" units may also be considered.

6 *Construction and External Finish:*

(a) The cabinet is to be all steel construction designed for maximum rigidity and robustness to prevent distortion during handling, transportation, etc.

(b) Concealed adjustable feet are to be fitted to ensure that the cabinet will stand firm on uneven floors.

(c) High quality steel panel-work treated with a suitable rust preventive primer and anti-corrosion undercoat and finish material giving maximum resistance to abrasion and corrosion is needed.

7 *Door:*

(a) The cabinet shall be fitted with two flush-fitting doors finished to match the cabinet, designed to withstand heavy usage and suitably braced or otherwise to prevent distortion in usage.

(b) The doors should be furnished with chromium plated fasteners and semi-concealed door hinges. They are to be completed with bottle racks, cheese and butter storage sections.

(c) The plastic door liner must be uniform in thickness (gauge) throughout particularly in relation to all inner radiused corners and be sufficiently rigid to prevent sagging when fully loaded with bottles etc. Bottle retainer strips shall be robustly constructed and secured.

(d) Magnetic locks are acceptable.

8 Internal Liner: heavy gauge enamelling quality steel one piece internal lining, with a generous radius to all corners and finished in white porcelain enamel, with acid-resisting base or proven quality high impact plastic liner of rigid of rigid construction and uniform thickness (gauge) throughout.

9 Breaker Strips: properly sized and installed to prevent popping out or removal in normal usage but shall be easily removable by trained service personnel without damage; the bottom breaker strip shall be sealed along the bottom and sides against entry of water from the bottom of the food liner.

10 Plastic Components: shall not impart noticeable odour or taste to food or water and shall be capable of withstanding use and storage conditions from -18 ^{o}C to 60 ^{o}C without crazing, cracking or permanently distorting.

11 *Insulation:*

(a) Insulation, when fiberglass, shall be so positioned in the cabinet and door so as to prevent settling. Loose filled insulation shall not be used. When foamed in place insulation is used, it shall be injected so as to provide a proper density and be without voids.

(b) The temperature on the outer surface of the refrigerator shall not be more than 4 ^{o}C below the ambient temperature when the refrigerator is operating in an ambient temperature of 43 ^{o}C and is held at its lowest thermostat setting for a period of 8 hours. Surfaces that are part of the refrigerator system or immediately adjacent thereto are excluded as points of measurement.

(c) The insulation area shall be sealed externally and internally to prevent the entry of water or water vapour from usage or cleaning.

(d) The insulation shall be of sufficient thickness to preclude condensation on any visible portion when exposed to the test condition shown under the "Duty" Clause.

12 Door Gasket: of the "Standard" or "Magnetic" type; should be robust and manufactured from a rubber base material in preference to plastic; should contain a fungoid inhibitor; for magnetic gaskets, the magnetic ceramic insert must be of full length on all sides with no gaps at the corners.

13 Shelves and Supports: made of either wire or bar; adequately protected against rusting and corrosion; must be sufficiently rigid to prevent distortion under full load conditions; spaced sufficiently closely to prevent small base containers from toppling and spilling their contents.

14 Welds and Solder Joints: wire brushed clean and washed with hot water or a suitable solvent to prevent corrosion.

15 *Internal Lighting:*

(a) The main food storage section (chiller) shall be supplied with an interior light of sufficient capacity to illuminate the entire interior. The light shall be activated by a door operated switch.

(b) Both the light and switch shall be protected from condensate drip.

16 *Evaporator:*

(a) The evaporator should consist of copper tubes soldered to the sides and bottom of a nonferrous metal shell (the whole being tinned/plated after fabrication) or be manufactured in aluminum with the coils formed on the underside and sides of the shell (the inner surfaces should preferably be flat).

(b) Ice trays of suitable design are to be included.

(c) With the exception of equipment designed for frost free operation, the refrigerator shall be provided with a drip tray of sufficient size with an anti-frost device and adequately sized drain, designed to prevent easy blockage, leading to the integral condensate disposal system.

17 *Refrigerator Unit:*

(a) The refrigerator unit shall be of the sealed unit type, hermetically sealed in a steel casing to suit mains supply voltage of 220-240 V, single phase a.c. 50 Hz, and fitted with an automatic self-resetting motor overload device.

(b) The unit and transformer, if applicable, shall be free from radio and TV reception interference.

(c) For refrigerators fitted with integral transformers, the quoted price in the tender shall include the cost of the transformer.

18 Condenser: of robust construction and of natural or forced convection type designed for maximum efficiency.

19 Controls: fitted with a finger-tip adjustable thermostat automatically maintaining the desired storage temperature and including Fast Freezing, Defrost, and Off position.

20 *Refrigerant*: non-toxic, non-explosive and odourless.

21 *Electric:*

(a) All electrical components and cabling shall conform to the appropriate British Standard Specifications, or shall be of fully equivalent capacity and quality.

(b) The refrigerator shall be fitted with a 3 metre long 3 core 0.75 mm^2 rubber or PVC covered cable and a 3 rectangular pin 13 amp B.S.S. plug.

22 *Technical Literature:*

(a) The following manufacturer's literature shall be supplied:

(i) 4 copies of Service Manual;

(ii) 4 copies of Spare Parts List;

(iii) One copy of the owner's instruction booklet to be supplied with each refrigerator.

(b) Supplier should also state whether additional copies of (iii) above can be supplied on request and whether free of charge, or at a price.

23 *Spares:*

(a) The supplier should guarantee a supply of any spare parts required within a period of four months from the date of the receipt of any order of such spares.

(b) A price list should be submitted with the quotation covering the parts listed below plus any others as recommended by the manufacturer.

Light Switch	Crisper
Light Socket	Crisper Cover
Light Bulb	Temperature Control
Overload Protection Unit	Ice Cube Tray
Starter Relay	Door Handle
	Door Gasket

24. Damaged in Transit: any parts damaged in transit should be replaced by factory finished product (for government schools only: No repair work should be made without prior consent of Government).

25 *Warranty:*

(a) The refrigerator shall be guaranteed against faulty material and workmanship for a period of one year from the date of acceptance.

(b) In addition, the hermetically sealed refrigeration system shall be similarly guaranteed for further four years after the expiry of (a) above.

(c) All materials and labour required within the above warranty periods shall be supplied free of charge unless occasioned by misuse or negligence.